Habitat Characteristics and Use

The Tehachapi pocket mouse is known to occur in grasslands (both native and nonnative), Joshua tree woodland, pinyon-juniper woodland, yellow pine woodland, and oak savannah (Williams et al. 1993). The five individuals that were captured on Tejon Ranch in 2010 were all found in arid shrub communities on slopes (Cypher et. al 2010). It has been recorded at higher elevations in open pine forests (Huey 1926) and at lower elevations in chaparral and coastal sage communities (Best 1994). It has also been detected in sandy soils (Sulentich 1983). It constructs burrows in loose, sandy soils (Zeiner et al. 1990b). Elevations range between 3,500 and 6,000 feet amsl.

Occurrence in the Study Area

As noted above, mammal surveys in 2010 identified five individual mice in and adjacent to the southeastern portion of the study area (Cypher et. al. 2010). Focused trapping surveys were also conducted for the Tehachapi pocket mouse in representative suitable or potential habitat in 2007 in the TMV Planning Area (Appendix E). The Tehachapi pocket mouse was documented in the southeastern portion of the TMV Planning Area during the 2007 surveys as well, between Oso and Dark Canyons (Dudek 2009). All occurrences in the TMV Planning Area are in the Antelope-Fremont Valley watershed, and focused studies seem to indicate that this is the northerly limit of the species' range. The ridgeline above the Antelope-Fremont Valley watershed occurrences, along with apparently unsuitable habitats, appears to pose significant obstacles to expansion of range. Therefore, Tehachapi pocket mouse is not expected to occur north of this watershed boundary. The CNDDB reports three occurrences of the Tehachapi pocket mouse in the TMV Planning Area, all along the southern edge of the study area (California Department of Fish and Game 2011). The study area appears to be largely at the edge of the species range, but because there are positive survey results in the TMV Planning Area, suitable habitat in the TMV Planning Area is considered occupied by the Tehachapi pocket mouse and lands elsewhere in the study area are considered to have moderate potential to support the species.

Modeled habitat for the Tehachapi pocket mouse in the study area includes conifer, savannah, woodland, and scrub within the Antelope-Fremont Valley watershed between 3,500 and 6,000 feet amsl and on slopes of 9 degrees or less (15% slopes or less) (Appendix D). A total of 1,931 acres of modeled habitat for Tehachapi pocket mouse was identified and mapped (Figure 3.1-26).

3.1.7.6 Reptiles

Coast Horned Lizard

Status and Distribution

The coast horned lizard is a California Species of Special Concern (California Department of Fish and Game 2011), but has no federal listing status.

The coast horned lizard is broadly distributed in California and occurs in the foothills of the Sierra Nevada from Butte County to Kern County and throughout most of coastal, central, and southern California. The species consists of the *blainvillei* and *frontale* populations. The *blainvillei* population occurs in southern California and northern Baja California, Mexico, between sea level and approximately 8,000 feet amsl; primarily distributed through the transverse ranges in Kern, Los Angeles, Santa Barbara, San Bernardino, and Ventura Counties, southward to the Peninsular Ranges in Orange, Riverside, and San Diego Counties (Stebbins 2003; Zeiner et al. 1988). The *frontale* population originally occurred from Shasta County southward into the south Coast Ranges, San Joaquin Valley, and Sierra Nevada foothills and into Los Angeles, Santa Barbara, and Ventura Counties, but has disappeared from approximately 35% of its range in northern and central California (Stebbins 2003, Zeiner et al. 1988). The *frontale* population is now abundant only in localized areas along the south Coast Ranges and in isolated sections of natural habitat remaining in the Central Valley. In Kern County, the *frontale* population is found between sea level and 6,496 feet amsl. It also occurs throughout Baja California, Mexico. Historically, coast horned lizard has been found along the Pacific coast from Baja California west of the deserts and the Sierra Nevada, north into the Bay Area, and inland as far north as Shasta Reservoir (CaliforniaHerps 2011). Despite a wide-ranging distribution, the coast horned lizard seems to be restricted to localized populations because of its association with loose soils that have a high sand content (Jennings and Hayes 1994). No population estimates are available, but the coast horned lizard may be declining as a result of habitat loss and fragmentation in its range, which is why it is considered a state Species of Special Concern (California Department of Fish and Game 2011). Approximately 45% of habitat within the species' southern California range had been converted to urban development or agriculture by 1994, and populations had been reduced by collection for the curio trade (Jennings and Hayes 1994). There are few extant populations in the southern coastal region (Jennings and Hayes 1994).

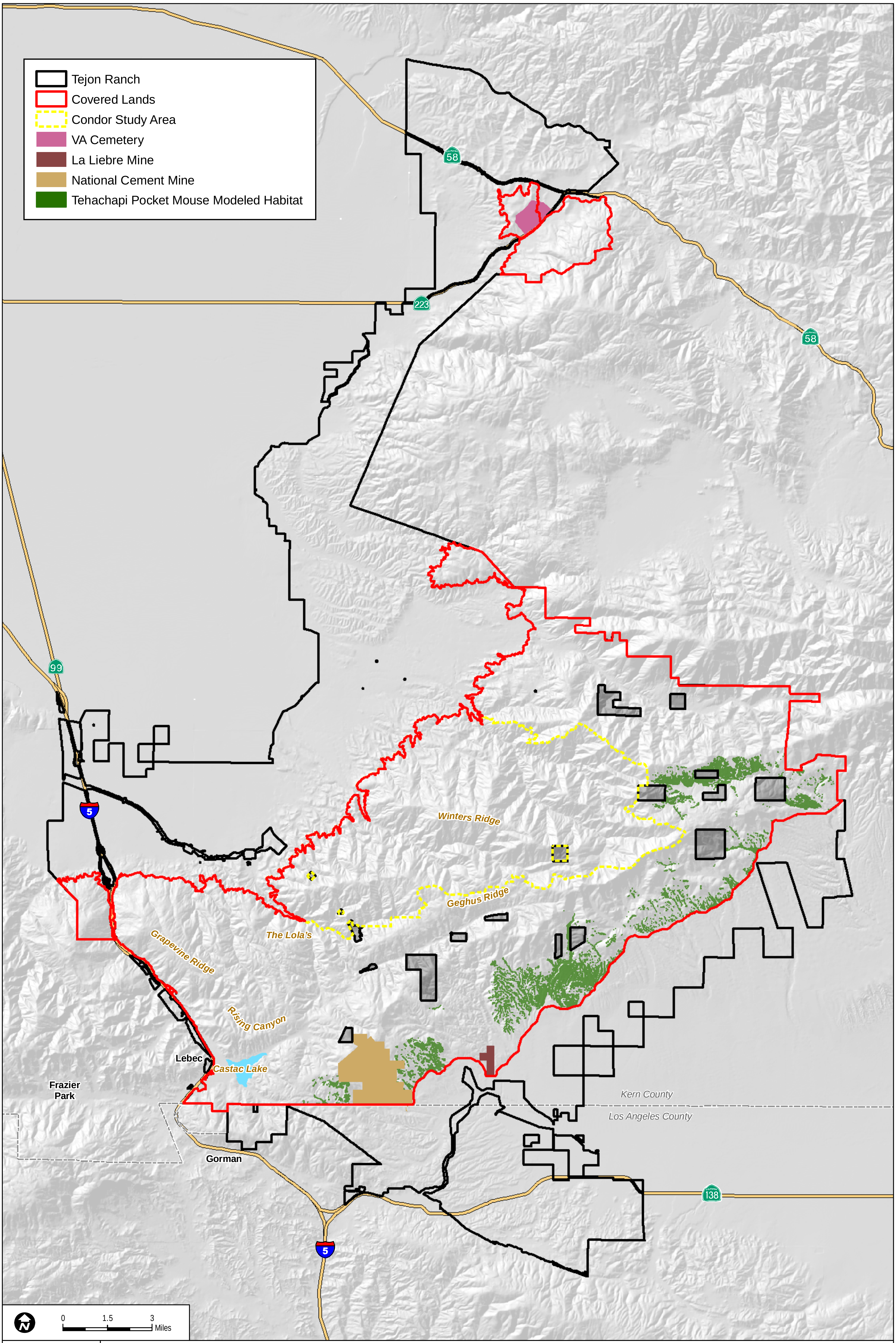
Habitat Characteristics and Use

The species is found in a wide variety of vegetation types with the requisite loose sandy soils, including California sagebrush scrub, annual grassland, chaparral, oak woodland, riparian woodland, and coniferous forest (Klauber 1939, Stebbins 1954). Other identified habitat characteristics include open areas with limited overstory for basking and low but relatively dense shrubs for refuge (Jennings and Hayes 1994). In inland areas, the species is restricted to areas with pockets of open microhabitat created by disturbance (e.g., floods, fire, roads, grazed areas, fire breaks) (Jennings and Hayes 1994).

Occurrence in the Study Area

Focused surveys were not conducted for the coast horned lizard (e.g., systematic transects or pitfall trapping), but incidental observations of this species during wildlife surveys were recorded. Coast horned lizards were observed in 12 different locations in the TMV Planning Area in 2007 (Dudek 2009). The majority of these observations were in the southwestern portion of the TMV Planning Area, southeast of Dry Field Canyon and north of Oso Canyon, in a wide variety of habitat types, including woodland, scrub, chaparral, and grassland (Dudek 2009, Tejon Ranch Company 2007). It was also observed in the study area during surveys in 2001 and 2002 (Impact Sciences2004) and in 2005 (Jones & Stokes 2006). The 2005 observations include three occurrences in the southeast portion of the TMV Planning Area, one occurrence in the northwest corner of Castac Lake at Grapevine Creek, and one occurrence in the north-central portion of the TMV Planning Area near a tributary to Silver Creek (Jones & Stokes 2006).

Modeled habitat for the coast horned lizard in the study area includes primary and secondary habitat at all elevations (Appendix D). Primary habitat includes grassland, conifer, scrub, woodland (less than 70% canopy cover), and wash. Secondary habitat included riparian scrub, riparian woodland, and riparian/wetland. A total of 41,083 acres of primary habitat and 62 acres of secondary habitat for coast horned lizard was identified and mapped in the study area (Figure 3.1-27). The coast horned lizard is expected to have a similar, scattered distribution throughout the study area to that observed in the TMV Planning Area because its occurrence is associated with



SOURCE: TRC 2007

FIGURE 3.1-26

Tehachapi Pocket Mouse Modeled Habitat

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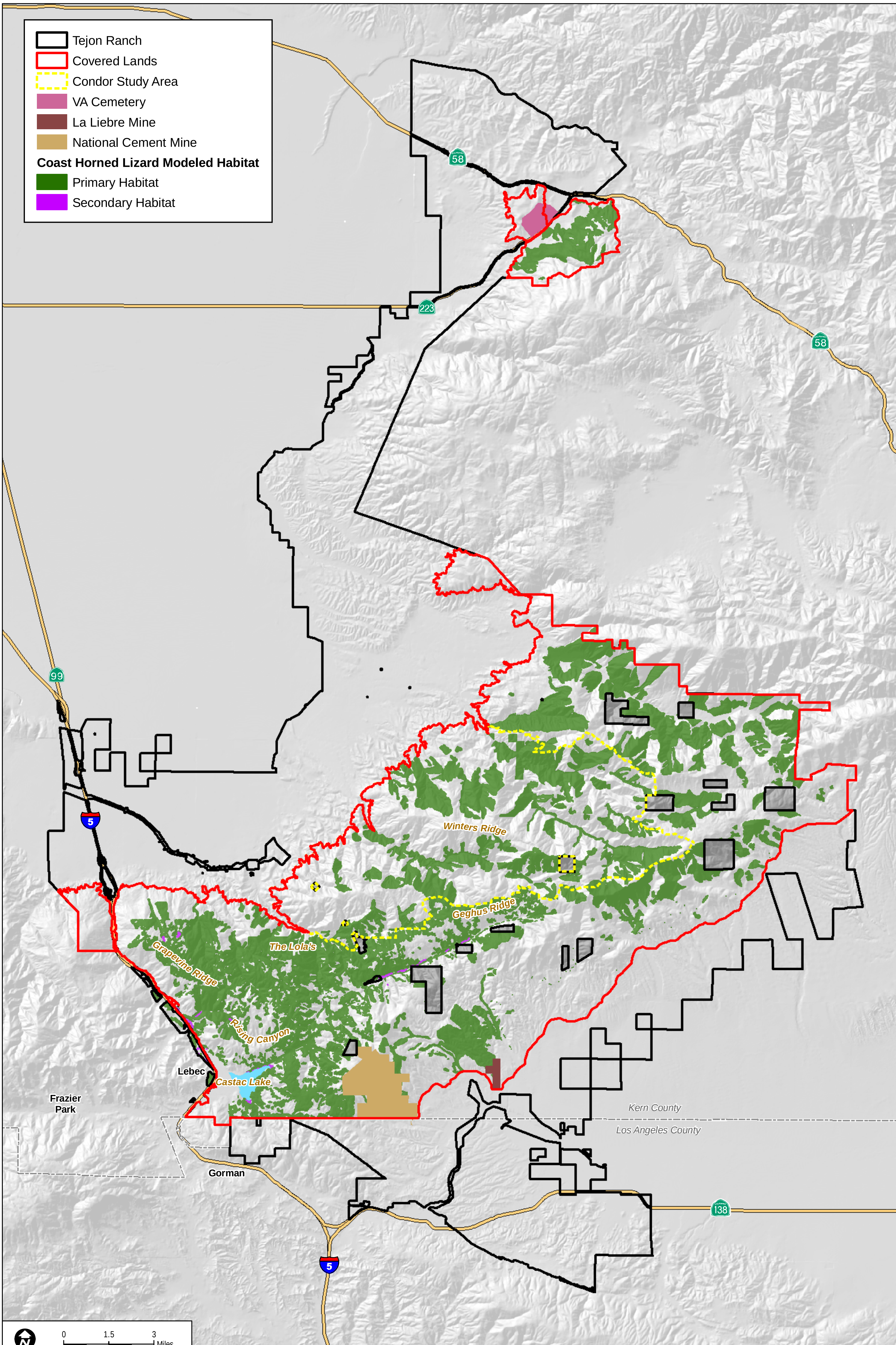

SOURCE: TRC 2007

FIGURE 3.1-27

Coast Horned Lizard Modeled Habitat

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microhabitats with a high sand content, basking areas, and low but relatively dense shrub cover that provides refuge (Jennings and Hayes 1994).

Two-Striped Garter Snake

Status and Distribution

The two-striped gartersnake is not federally listed but is a CDFG Species of Special Concern (California Department of Fish and Game 2011).

The two-striped gartersnake is endemic to southern California and Baja California, Mexico. It is found through coastal California in the vicinity of the southeast slope of the Diablo Range and the Salinas Valley south along the Coast and Transverse Ranges to Rio Rosario in Mexico (NatureServe 2008). Natural history records for the two-striped gartersnake in California include records along riparian areas through the south Coast and Peninsular Ranges, west of the San Joaquin Valley, deserts in the vicinity of Salinas (Monterey County) and Cantua Creek (Fresno County), and south to Las Presa, Baja California (Jennings and Hayes 1994). Although the two-striped gartersnake was historically common throughout this range and is the most common gartersnake in southern California's cismontane region (Schwenkmeyer 2007), it is now abundant only in eastern San Diego County.

Habitat Characteristics and Use

The two-striped gartersnake occurs in a variety of perennial and intermittent freshwater streams within oak woodlands, shrublands, and sparse coniferous forests from sea level to 7,874 feet amsl (Stebbins 2003, Zeiner et al. 1990c). It is restricted to streams, vernal pools, lakes, and stock and artificial ponds with good adjoining riparian vegetation (Jennings and Hayes 1994, Schwenkmeyer 2007) and is commonly found within wetlands and streams having rocky or sandy beds with willows or dense vegetation (Zeiner et al. 1990c). Two-striped gartersnakes tend to stay near water, entering and retreating to it when alarmed (Stebbins 2003). They use dense vegetation, flat rocks, rocky outcrops, and rotting logs as cover (Zeiner et al. 1990c). At night, two-striped gartersnakes retreat to burrows, crevices, and surface objects with other snakes for protection and thermoregulation (Zimmerman 2002).

Occurrence in the Study Area

Focused surveys were not conducted for the two-striped garter snake in the study area, but incidental observations of this species during wildlife surveys were recorded. Two-striped gartersnakes were observed in 2007 in the southwestern and central portions of the TMV Planning Area east of Rising Canyon, in Dry Field Canyon, and in Bear Trap Canyon in oak savannah and chaparral habitats near water sources (Dudek 2009). The two-striped gartersnake is expected to occur throughout modeled habitat in the study area, with distributions similar to those found within the TMV Planning Area. This species was also observed in 2001, 2002, and 2003 at Castac Lake adjacent to the TMV Planning Area and at an on-site stock pond south of the lake. The two-striped garter snake was not observed during 2005 wildlife surveys (Jones & Stokes 2006).

Modeled habitat in the study area includes riparian scrub, riparian woodland, riparian/wetland, wetland, and wash, plus intermittent streams, seeps, and springs with a 100-foot buffer at all elevations within the western Transverse Range (Appendix D). A total of 364 acres of modeled habitat for two-striped garter snake was identified and mapped (Figure 3.1-28).

3.1.8 Plant Species Considered for Conservation under the TU MSHCP

This section describes the status of the special-status plant species in the study area that are considered for conservation under the TU MSHCP. For each species, the Federal and state regulatory status, California Rare Plant Rank (CRPR), and rangewide distribution are described, followed by a description of the species' known habitat associations and its occurrence in the study area, including a summary of surveys conducted for the species, known occurrences, and modeled habitat. A summary listing of these species in provided in Table 3.1-4.

3.1.8.1 Method for Evaluating Potential Occurrence in the Study Area

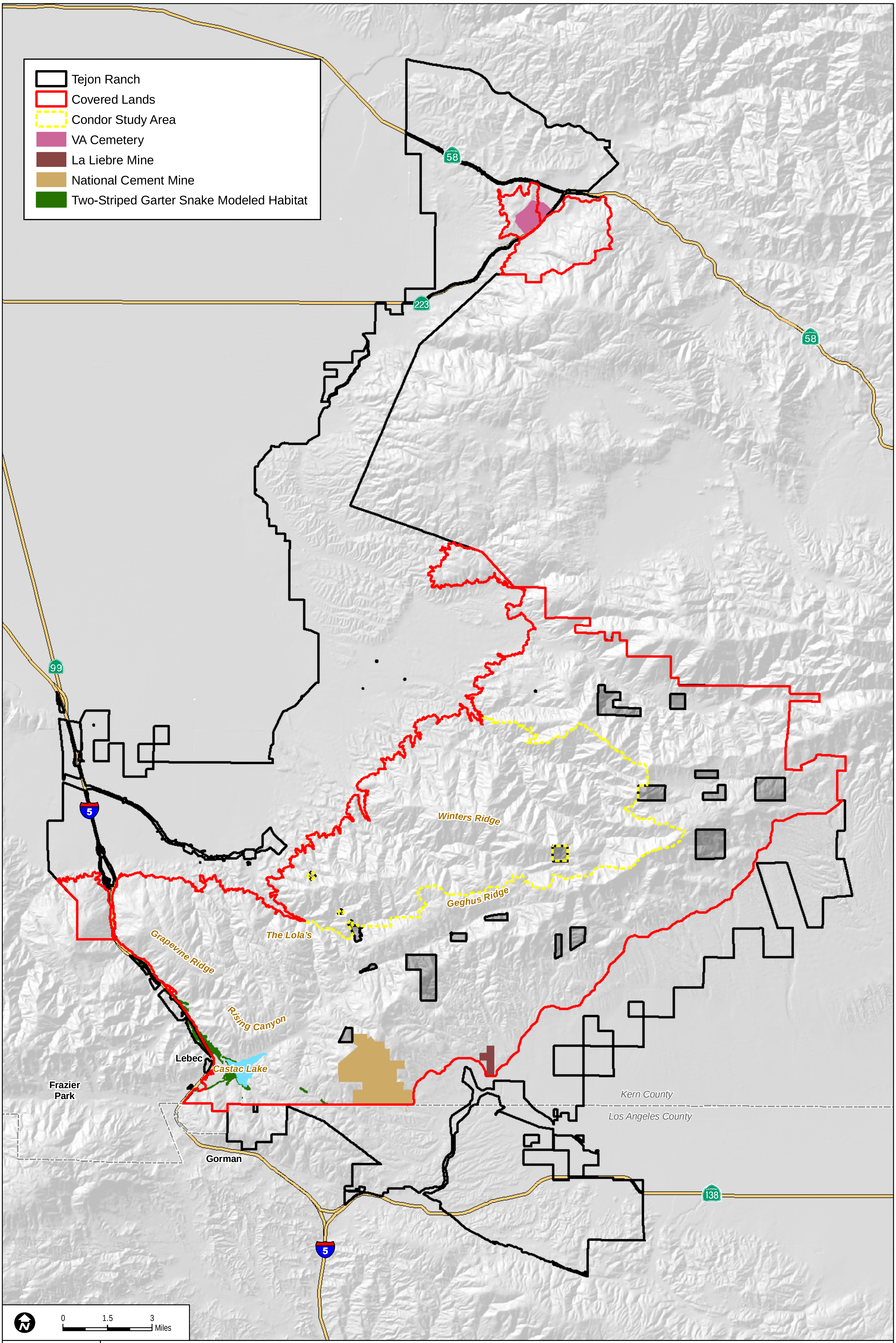
The potential presence of special-status species plants in the study area was evaluated by compiling occurrence data from species-specific surveys and collection of historical data, and through an analysis of modeled vegetation and habitat associations.

Occurrence Data

Species occurrence data, including GIS-based data from surveys of portions of the study area and CNDDB occurrence data, were reviewed to develop an understanding of the general distribution and relative abundance of plant species proposed for coverage under the TU MSHCP. Detailed special-status plant data for the TMV Planning Area was collected during botanical surveys in 2003 and 2004 (Vollmar Consulting 2004), wildlife and botanical surveys in 2005 (Jones & Stokes 2006, 2008), and wildlife and botanical surveys in 2007 (Dudek 2007a, 2007b). Appendix E, describes the methods used to complete each of the focused surveys for special-status species plants, as well as factors related to the detectability of plant species. Survey limitations specific to plants were related to geographic coverage and precipitation levels. Detailed special-status plant surveys have not been conducted throughout the study area. Dudek (2007a, 2007b) notes that precipitation in 2007 was somewhat below normal, which may have limited detection of some plant species. However, botanical surveys were also conducted in 2003 through 2005 on portions of the study area when precipitation was considered normal to above normal (Vollmar Consulting 2004, Jones & Stokes 2006).

Habitat Models

As described above, the effects analysis provided in this Supplemental Draft EIS is based on modeled habitat for the six plant species considered for conservation under the TU MSHCP. Spatial data used for the habitat models includes vegetation communities, canopy cover, water features and drainages, elevation, slope, and soils, as applicable and as indicated by the scientific literature available for the species. In addition, two nonspatial (GIS-based) resources related to species occurrences are used to determine general distribution patterns, including the 2007 CNPS online inventory (California Native Plant Society 2007) and CDFG's Life History Accounts and Range Maps —California Wildlife Habitat Relationships System (California Department of Fish and Game 2007a). Because of the general nature of the data and model parameters, it was not possible to incorporate microhabitat features into the models that may be important for selection and patterns of habitat use for many of the species, and the habitat models are not intended to be used as predictors of actual occupation of certain areas of the study area by a species.



SOURCE: TRC 2007

FIGURE 3.1-28

Two-Striped Garter Snake Modeled Habitat

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3.1.8.2 Fort Tejon Woolly Sunflower

Status and Distribution

The Fort Tejon woolly sunflower (*Eriophyllum lanatum* var. *hallii*) has no Federal or state designation but is has a CRPR of 1B.1 and is considered rare, threatened, or endangered in California and elsewhere (California Department of Fish and Game 2010). In addition, it has a California Heritage Element Ranking of S1, which means that it is critically imperiled in the state because of extreme rarity (often five or fewer occurrences), or because it has one or more characteristics (e.g., steep population declines) that make it especially vulnerable to extirpation in the state/province (California Department of Fish and Game 2010).

The range of the Fort Tejon woolly sunflower is considered to be the southern Tehachapi Mountains (near Fort Tejon) and the Sierra Madre Mountains in the southeastern–outer south Coast Ranges (University of California, Berkeley 2011)). According to CNPS, it is known only from Kern and Santa Barbara Counties (California Native Plant Society 2011).

The largest population based on CNDDB occurrence data was found in Santa Barbara County in 2003, and included approximately 370 plants (California Department of Fish and Game 2011). Other CNDDB occurrences include 15 clumps of plants observed in the Los Padres National Forest in 2003; an undisclosed number of plants in Fort Tejon; and an estimated 530 plants in 1987 and hundreds in 1995 east of Johnson Canyon and north of O'Neil Canyon (California Department of Fish and Game 2011).

Habitat Characteristics and Use

General habitat for Fort Tejon woolly sunflower is in chaparral and cismontane woodland vegetation at elevations from 3,494 to 4,921 feet amsl (California Native Plant Society 2011). The largest reported population was observed growing in a colony on a north-facing slope with Tucker oak (*Quercus john-tuckeri*) chaparral and pinyon-juniper woodland nearby. The plants were growing on friable soil in a roadside bank (Smith 1998) and on the silt loam soil of the road itself. The Fort Tejon woolly sunflower also occurs in other microhabitats, such as a rocky canyon in the upper Sonoran zone, openings in chaparral, and a steep slope with sandy-clay loam soils (California Department of Fish and Game 2011). Plant species associated with the Fort Tejon woolly sunflower include interior live oak, blue oak, valley oak, scrub oak, pinyon pine (*Pinus monophylla*), silk tassel bush (*Garrya flavenscens* ssp. *pallida*), cliff aster (*Malacothrix* sp.), California coffeeberry (*Rhamnus californica*), rubber rabbitbrush (*Chrysothamnus nauseosus*), and silver lupine (*Lupinus albifrons*) (California Department of Fish and Game 2011).

Occurrence in the Study Area

Presence/absence surveys were conducted for the Fort Tejon woolly sunflower in 2007 in the TMV Planning Area. A total of 36 locations was observed in the central portion of the TMV Planning Area in Bear Trap Canyon; in the far western portion in Rising Canyon near I-5; and in the south-central portion near Poleline Ridge, Skinner Canyon, and Johnson Canyon. The 36 locations were observed in April, May, and June 2007 and represent approximately 3,000 to 8,500 individuals (Dudek 2007a). The species was observed primarily on gravelly loam between 3,600 and 5,000 feet amsl (Dudek 2007a; Intermap Technologies. 2005). The majority of these locations are on young alluvial terraces and debris flows and granite and quartz monzonite (Dudek 2007a, ENGEO 2008). In the TMV Planning Area, this species is primarily associated with oak woodlands, although it has also been observed in scrub (Dudek 2007a, 2007c). It is most strongly tied to north- and south-facing slopes (Dudek 2007a, Intermap Technologies2005). In the TMV Planning Area, all locations are on slopes that are not considered steep (less than 45°) (Dudek 2007a, Intermap Technologies 2005). There are no other CNDDB occurrences in the study area; however, there are occurrences west of I-5 near Fort Tejon State Historic Park (California Department of Fish and Game 2011).

Modeled habitat in the study area includes chaparral, conifer, riparian woodland, scrub, oak woodland, and oak savannah vegetation communities on all soils that occur at elevations between 3,490 and 5,000 feet amsl. A total of 57,430 acres of suitable habitat for Fort Tejon woolly sunflower was identified and mapped (Figure 3.1-29).

3.1.8.3 Kusche's Sandwort

Status and Distribution

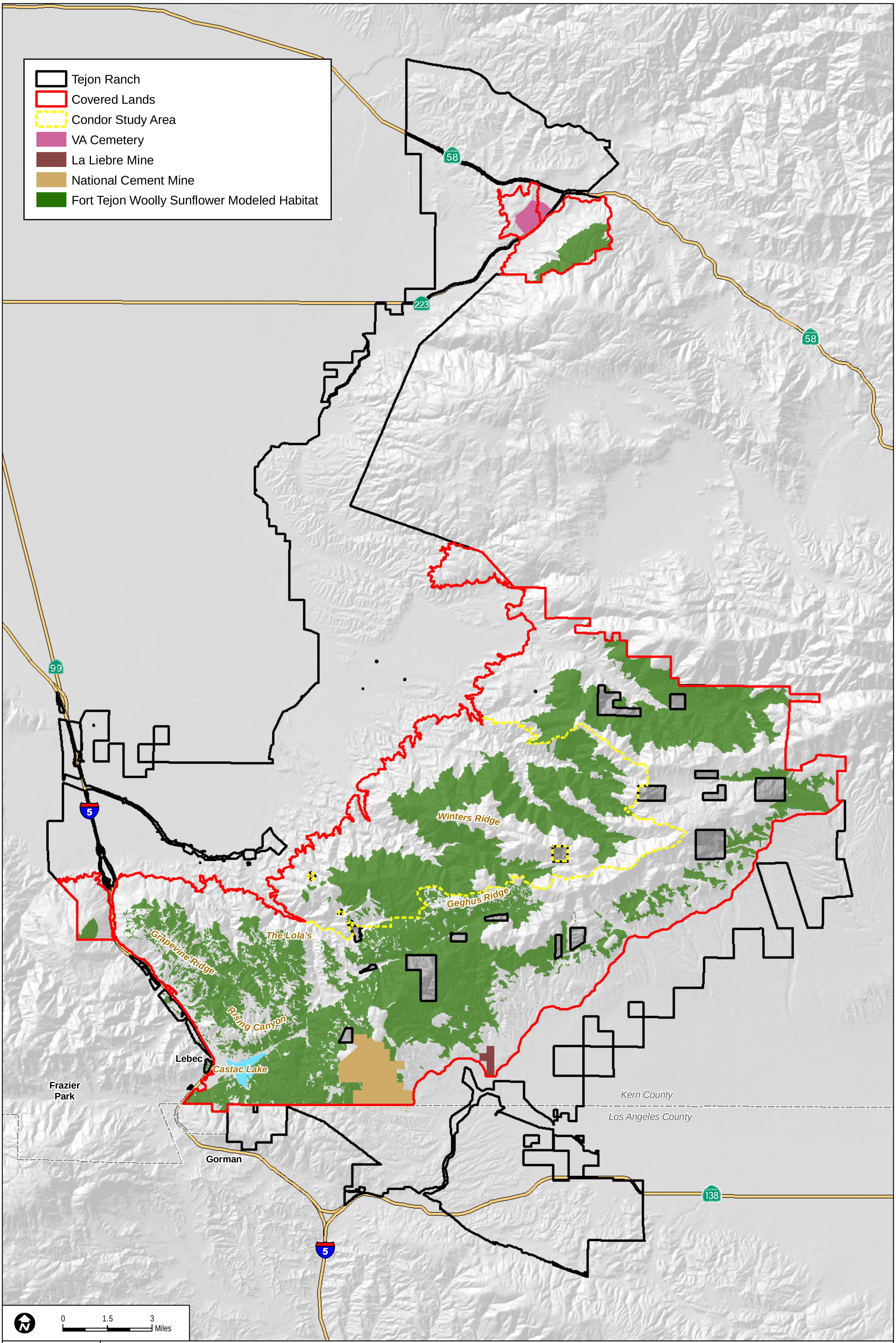
Kusche's sandwort (formerly *Arenaria macradenia* var. *kuschei*; now *Eremogone macradenia* var. *arcuifolia* based on recent collections by Hartman et al. [2005]) was formerly a CNPS List 1B.1 species but has not been assigned a CRPR. The species *Eremogone macradenia* is widespread, with a distribution in the southern Sierra Nevada and San Gabriel Mountains. The former *A. m.* var. *kuschei* may be an extreme local variant of *E. m.* var. *arcuifolia* (Stephenson and Calcarone 1999). Although morphologically similar, *A. m.* var. *kuschei* differs from *E. m.* var. *arcuifolia* in its densely stipulate–glandular inflorescence (peduncles, pedicels, and calyces) (Jepson Flora Project 2011).

Habitat Characteristics and Use

Habitat for Kusche's sandwort includes openings in chaparral on granitic soil between 3,660 and 5,100 feet amsl (California Native Plant Society 2011). The species has also been reported in open black oak and canyon live oak woodland, and sparse low scrub and subshrubs within dense chaparral (California Department of Fish and Game 2011). All known occurrences of Kusche's sandwort have been reported from areas of gentle to moderate topography (California Department of Fish and Game 2011). Plant species associated with Kusche's sandwort include birchleaf mountain-mahogany (*Cercocarpus betuloides* var. *betuloides*), procumbent lotus (*Lotus procumbens*), canyon live oak, ripgut brome (*Bromus diandrus*), one-sided bluegrass (*Poa secunda* ssp. *secunda*), prairie junegrass (*Koeleria macrantha*), and California aster (*Lessingia filaginifolia*) (Dudek 2007a).

Occurrence in the Study Area

Presence/absence surveys were conducted for Kusche's sandwort in 2007 in the TMV Planning Area. Kusche's sandwort was observed in seven distinct occurrences in the TMV Planning Area, representing approximately 20 to 30 individuals in canyon live oak forest (Dudek 2007a, 2007c). Occurrences were on granite to quartz monzonite, young alluvial terraces, and debris flows between 3,800 and 4,200 feet amsl (Dudek 2007a, ENGEO 2008, Intermap Technologies 2005). The majority of occurrences were found on north-facing slopes from 15° to 45°, although the species was also present on steeper slopes (Dudek 2007a, Intermap Technologies 2005). None of the areas in which Kusche's sandwort was found had burned since 1912. There are no CNDDB records of Kusche's sandwort in the study area; however, there are five CNDDB occurrences of Kusche's sandwort south of the study area in northern Los Angeles County, approximately 7 miles south of the TMV Planning Area boundary on the ridgeline of Liebre Mountain (California Department of Fish and Game 2011, Tejon Ranch Company 2007).



SOURCE: TRC 2007

FIGURE 3.1-29

Fort Tejon Woolly Sunflower Modeled Habitat

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Modeled habitat in the study area includes chaparral, riparian woodland, oak woodland, and oak savannah vegetation communities on granitic soils that occur at elevations between 3,800 and 5,600 feet amsl. A total of 30,505 acres of modeled habitat for Kusche's sandwort was identified and mapped (Figure 3.1-30).

3.1.8.4 Round-Leaved Filaree

Status and Distribution

Round-leaved filaree (*California macrophylla*) has no Federal or state designation but has a CRPR of1B.1 (California Department of Fish and Game 2010). This species has a California Heritage Element Ranking of S2, which means that it is imperiled in the state because of rarity resulting from one or more of the following characteristics: a very restricted range, very few populations (i.e., 20 or fewer), steep population declines, or other factors making it very vulnerable to extirpation from the nation or state/province (California Department of Fish and Game 2010).

The range of round-leaved filaree extends from Baja California (i.e., northern Mexico) to Oregon (California Native Plant Society 2011). Extant occurrences are reported in 27 counties in California, from Lassen to San Diego; this species has been extirpated from Santa Cruz Island and may also be extirpated from Butte County (California Native Plant Society 2011). Gillespie (2003) determined that 105 unique populations have been reported, with most on the eastern side of the California Coast Ranges. The Jepson Online Interchange for California Floristics (Jepson Flora Project 2007) lists the Sacramento Valley, northern San Joaquin Valley, central western California, south coast, northern Channel Islands (i.e., Santa Cruz Island), western Transverse Range, and the Peninsular Ranges as the geographic regions in which round-leaved filaree occurs. While apparently well distributed in central and northern California, it is very rare in southern California (Reiser 2001). It is considered scarce and declining in western Riverside County (Roberts et al. 2004).

The CNDDB contains 142 records for round-leaved filaree in California, of which 12 are documented from Kern County (California Department of Fish and Game 2011). All 12 occurrences in Kern County are considered extant. One occurrence is on the Wind Wolves Preserve, one on publicly held land, and ownership on the remaining six occurrences is unknown (California Department of Fish and Game 2011). In Kern County, the species is reported from the Temblor Range, the foothills east of Tehachapi, in the extreme southwestern Tehachapi Mountains along the northwest side of the Antelope Valley, at Dry Bog Knoll, and at the head of Adobe Canyon in the Greenhorn foothills (Twisselmann 1967). Collections by Wiggins and Wolf from 1935 at the borders of Kern County have not been more recently verified (California Department of Fish and Game 2011). A population of about 400 plants was reported in 2004 at Bodfish, south of Lake Isabella (California Department of Fish and Game 2011).

Habitat Characteristics and Use

Round-leaved filaree typically occurs in open sites on clay soils in cismontane woodland and valley and foothill grassland between 49 and 3,937 feet amsl (California Native Plant Society 2011). Most verified reports in the CNDDB are from annual grasslands with a mixture of nonnative grasses and native forbs. Blue oak woodland is the only type of woodland associated with round-leaved filaree populations in the CNDDB (California Department of Fish and Game 2011). Wind Wolves Preserve (formerly San Emigdio Ranch) in Kern County has two metapopulations reported in blue oak woodlands (California Department of Fish and Game 2011).

The Bodfish Canyon population near Lake Isabella occurs on open, red clay soils in vegetation dominated by blue oak and California juniper. Woolly fish-hooks (*Ancistrocarphus filagineus*), Pringle's yampah (*Perideridia pringlei*), common goldenstar (*Bloomeria crocea*), and cupleaf ceanothus (*Ceanothus greggii*) were also present in this habitat dominated by native plants (California Department of Fish and Game 2011). Gillespie (2003) found that bare ground occupied from 16% to 89% of the five sites examined, with the largest populations (approximately 700 and 1,000) occurring in areas with the most nonnative grasses (21% and 39%, respectively).

Within annual grassland habitats, plant species associated with round-leaved filaree recorded from collections from Los Angeles and Kern counties include native species, such as fascicled tarweed (*Deinandra fasciculata*), blue dicks (*Dichelostemma capitatum*), short-podded lotus (*Lotus humistratus*), dwarf plantain (*Plantago erecta*), Palmer's rabbitbrush (*Ericameria palmeri* ssp. *pachylepis*), blow-wives (*Achyrachaena mollis*), woolly fish-hooks, California goldfields (*Lasthenia californica*), and tidy-tips (*Layia platyglossa*) (California Department of Fish and Game 2011). Nonnative species include tocalote (*Centaurea melitensis*), red-stem filaree (*Erodium cicutarium*), wild oats (*Avena* spp.), and soft chess (*Bromus hordeaceus*) (California Department of Fish and Game 2011).

Occurrence in the Study Area

Presence/absence surveys were conducted for round-leaved filaree in 2007 in the TMV Planning Area. Round-leaved filaree was observed in the southeast portion of the TMV Planning Area (Dudek 2007a). This species was observed in 11 areas that supported approximately 430 to 730 individuals. These occurrences are at elevations between 4,200 and 4,600 feet amsl (Dudek 2007a, Intermap Technologies 2005), and the majority are on rescue variant loam, which contains reddish-brown and reddish-yellow clay loam in the subsoil (U.S. Department of Agriculture 1981). In the study area, this species is primarily associated with annual grasslands but is also found in blue oak woodland, scrub, and scrub oak chaparral (Dudek 2007a, Tejon Ranch Company 2007). There are no CNDDB records of round-leaved filaree in the study area; however, there is an occurrence approximately 2 miles south of the study area (California Department of Fish and Game 2011).

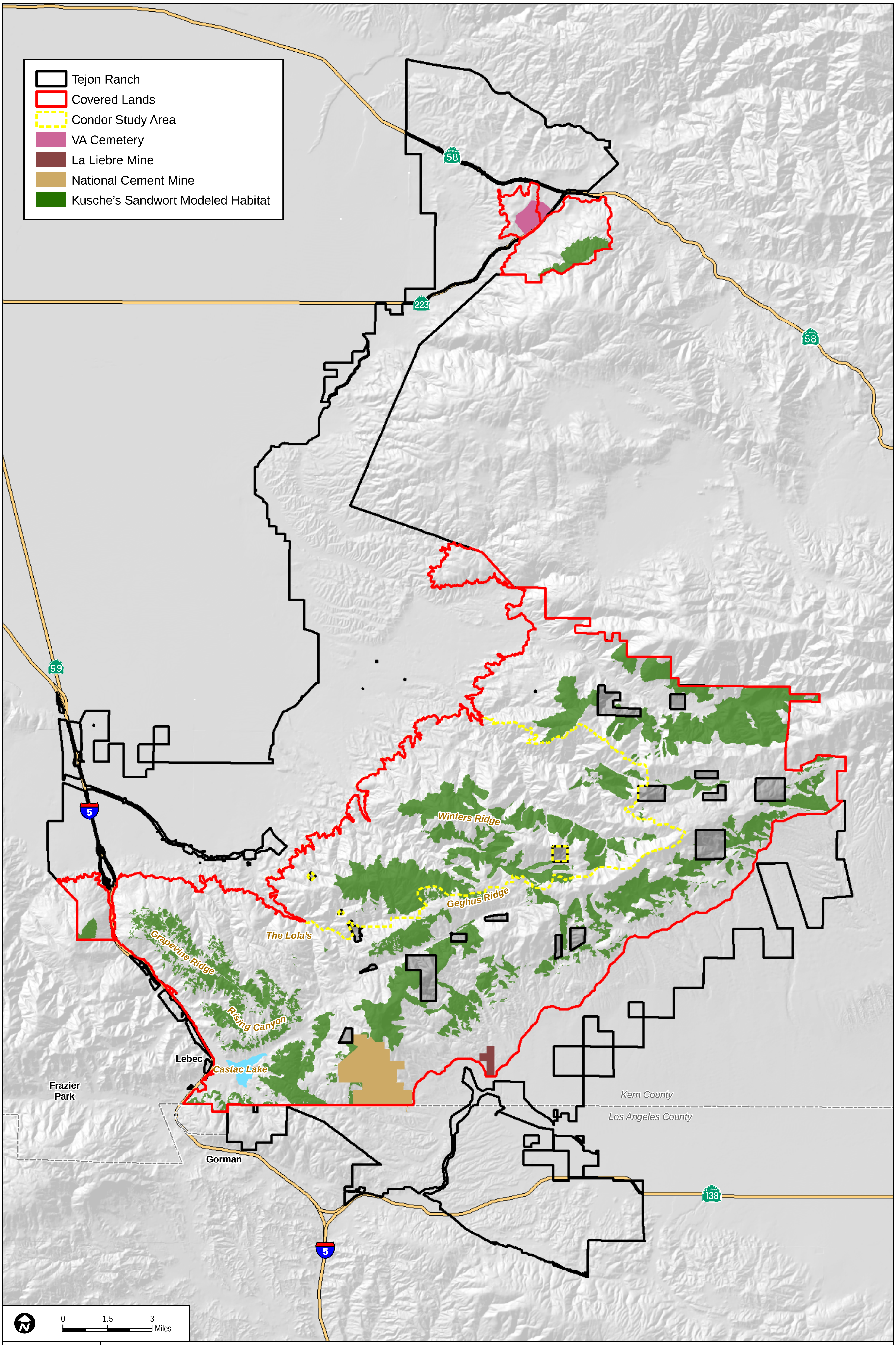
Modeled habitat for round-leaved filaree in the study area includes chaparral, conifer, grassland, riparian woodland, scrub, oak woodland, and oak savannah vegetation communities on clay soils that occur at elevations between 1,900 and 4,600 feet amsl. A total of 58,073 acres of modeled habitat for round-leaved filaree was identified and mapped (Figure 3.1-31).

3.1.8.5 Striped Adobe Lily

Status and Distribution

The striped adobe lily (*Fritillaria striata*) has no Federal designation but has been listed in California as threatened since 1987. The striped adobe lily has a CRPR of1B.1 and California Heritage Element Ranking of S2.1 (California Department of Fish and Game 2010).

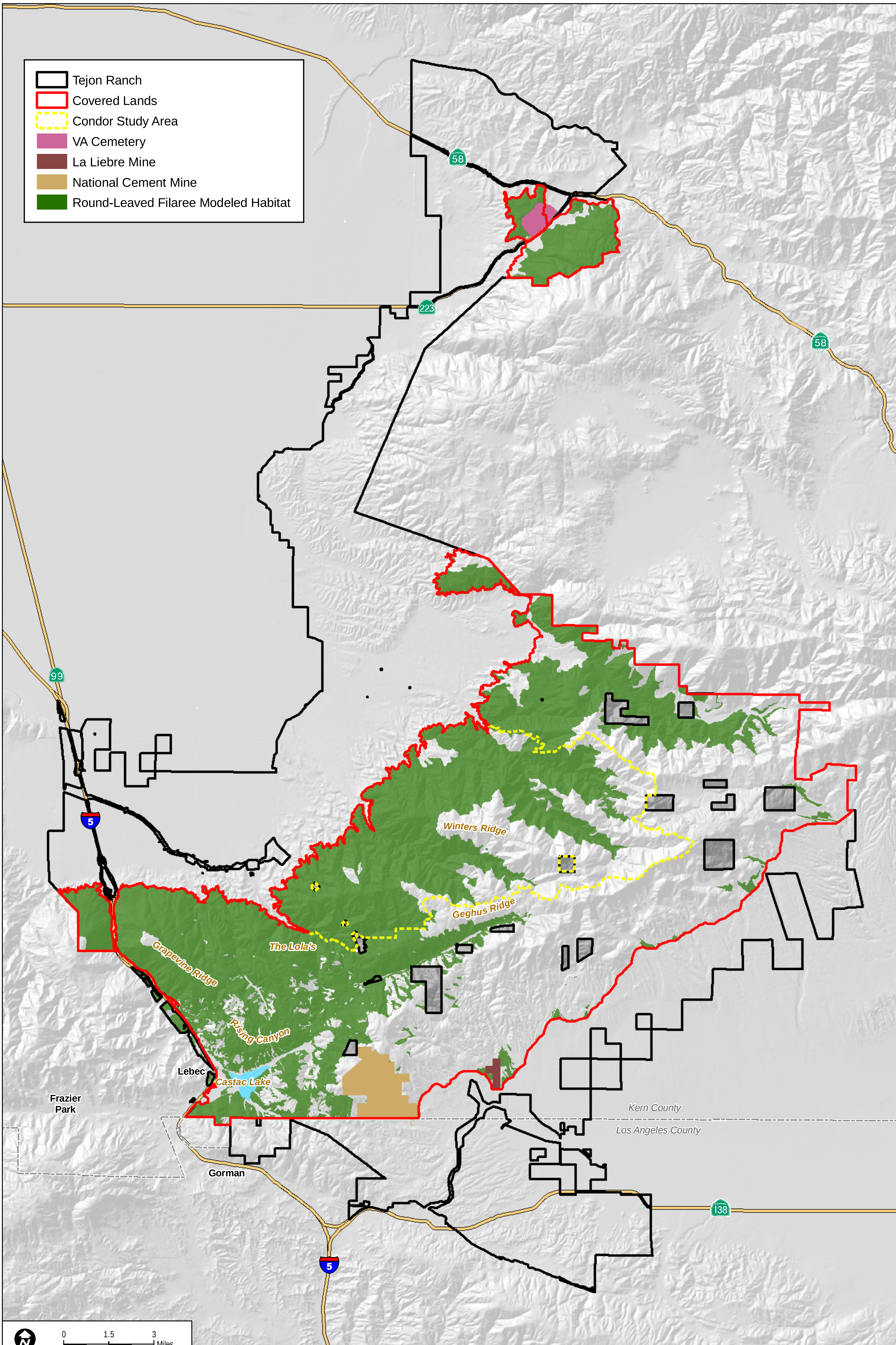
The striped adobe lily is endemic to the southern Sierra Nevada foothills of eastern Tulare and Kern counties (California Department of Fish and Game 2000b). The Jepson Online Interchange for California Floristics (Jepson Flora Project 2007) lists the southern Sierra Nevada, especially the Greenhorn Mountains, as the geographic region in which striped adobe lily occurs. The CNDDB contains 23 records for striped adobe lily in California, 16 of which are from Kern County (California Department of Fish and Game 2011, California Native Plant Society 2011). Fifteen of the populations



SOURCE: TRC 2007

FIGURE 3.1-30

Kusche's Sandwort Modeled Habitat



SOURCE: TRC 2007

FIGURE 3.1-31

Round-Leaved Filaree Modeled Habitat

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from Kern County occur on private land and the land ownership of the other is unknown. All but one of the Kern County occurrences are considered extant. The striped adobe lily is reported from various places throughout the county, including the Greenhorn Mountains, along Rancheria Road, and in the Tejon Hills. The three Tejon Hills records are in the northern portion of the study area.

At least four populations of striped adobe lily are known to have been extirpated when their habitat was converted to agricultural lands. Three more populations at lower elevations on the slopes of Lewis Hill near Frazier Valley are threatened by expansion of citrus orchards (California Department of Fish and Game 2000b).

Habitat Characteristics and Use

Striped adobe lily occurs in clay soils in cismontane woodland and grassland habitats (California Native Plant Society 2011). Striped adobe lily is restricted to heavy, usually red, clay soils, but the physiological and/or ecological basis for this restriction is not known (Stebbins 1989). Populations of striped adobe lily typically occur on the lower portions of north-facing slopes (Stebbins 1989) between 443 and 4,774 feet amsl.

Most of the verified reports in the CNDDB are from annual grasslands with a mixture of nonnative grasses and native forbs (California Department of Fish and Game 2007b). At least two documented occurrences of striped adobe lily are from oak woodlands, and one record is from a native perennial grassland.

The largest documented population of striped adobe lily occurs in Kern County about 1 mile northeast of Long Tom Mine in the USGS Pine Mountain quadrangle. About 100,000 individuals were documented in this population in 1990, and densities near the center of the occurrence ranged from five to nine plants per square foot between 1998 and 2001 (California Department of Fish and Game 2007b). The population occurs on private property in oak woodland on heavy clay soils. Other plants associated with this population include filaree (*Erodium* sp.), lomatium (*Lomatium* sp.), soap plant (*Chlorogalum* sp.), peppergrass (*Lepidium* sp.), snakelily (*Dichelostemma* sp.), miner's lettuce (*Montia* sp.), fiddleneck (*Amsinckia* sp.), and buttercup (*Ranunculus* sp.).

Occurrence in the Study Area

Most recently, presence/absence surveys for striped adobe lily were conducted in 2007 within the TMV Planning Area. Survey results were negative (Dudek 2007a). In 2011, Dudek conducted a focused survey for stribed adobe lily in the Beartrap Turnout Improvement Project study area (Dudek 2011); survey results in this area were also negative. There are three CNDDB records of striped adobe lily near Tejon Hills, in the northern portion of the study area (California Department of Fish and Game 2011).

Modeled habitat for this species in the study area includes grasslands and oak savannahs on clay soils that occur between 400 and 4,800 feet amsl. A total of 32,213 acres of modeled habitat for striped adobe lily was identified and mapped (Figure 3.1-32).

3.1.8.6 Tehachapi Buckwheat

Status and Distribution

The Tehachapi buckwheat (*Eriogonum callistum*) is a new species and the sole representative of a new section, *Lanocephala*, within the subgenus *Eucycla* in the genus *Eriogonum*. It does not have Federal or state status, but has a CRPR of 1B.1 and a California Heritage Element Ranking of S1 (California Department of Fish and Game 2010). The CNDDB has only a single record of Tehachapi buckwheat that is reported within the Lebec USGS 7.5-minute quadrangle (California Department of Fish and Game 2011).

Tehachapi buckwheat is only known to be from the area immediately in and around the south-central portion of the study area. It was first observed during special-status plant surveys conducted by Jones & Stokes (2006).

Habitat Characteristics and Use

Tehachapi buckwheat was observed on limestone between 4,400 and 5,410 feet amsl in elevation during various surveys of the study area (Dudek 2007a, ENGEO 2008, Intermap Technologies 2005). The majority of these plants were observed in openings in chaparral on gravelly loam or rock outcrop complex (Dudek 2007a, U.S. Department of Agriculture 1981). In the study area, this species is primarily associated with chaparral dominated by Parry manzanita (*Arctostaphylos parryana*). It is less often associated with pinyon pine (singleleaf pinyon, *Pinus monophylla*) woodlands and chaparral dominated by chamise (*Adenostoma fasciculatum*) (Dudek 2007a, 2007c). Other associated species include Utah service-berry (*Amelanchier utahensis*), chaparral yucca, and scrub oak.

Occurrence in the Study Area

Presence/absence surveys for Tehachapi buckwheat were conducted in 2007 in the TMV Planning Area. Tehachapi buckwheat was observed in 31 locations in the TMV Planning Area, representing approximately 500 to 600 individuals (Dudek 2007b).

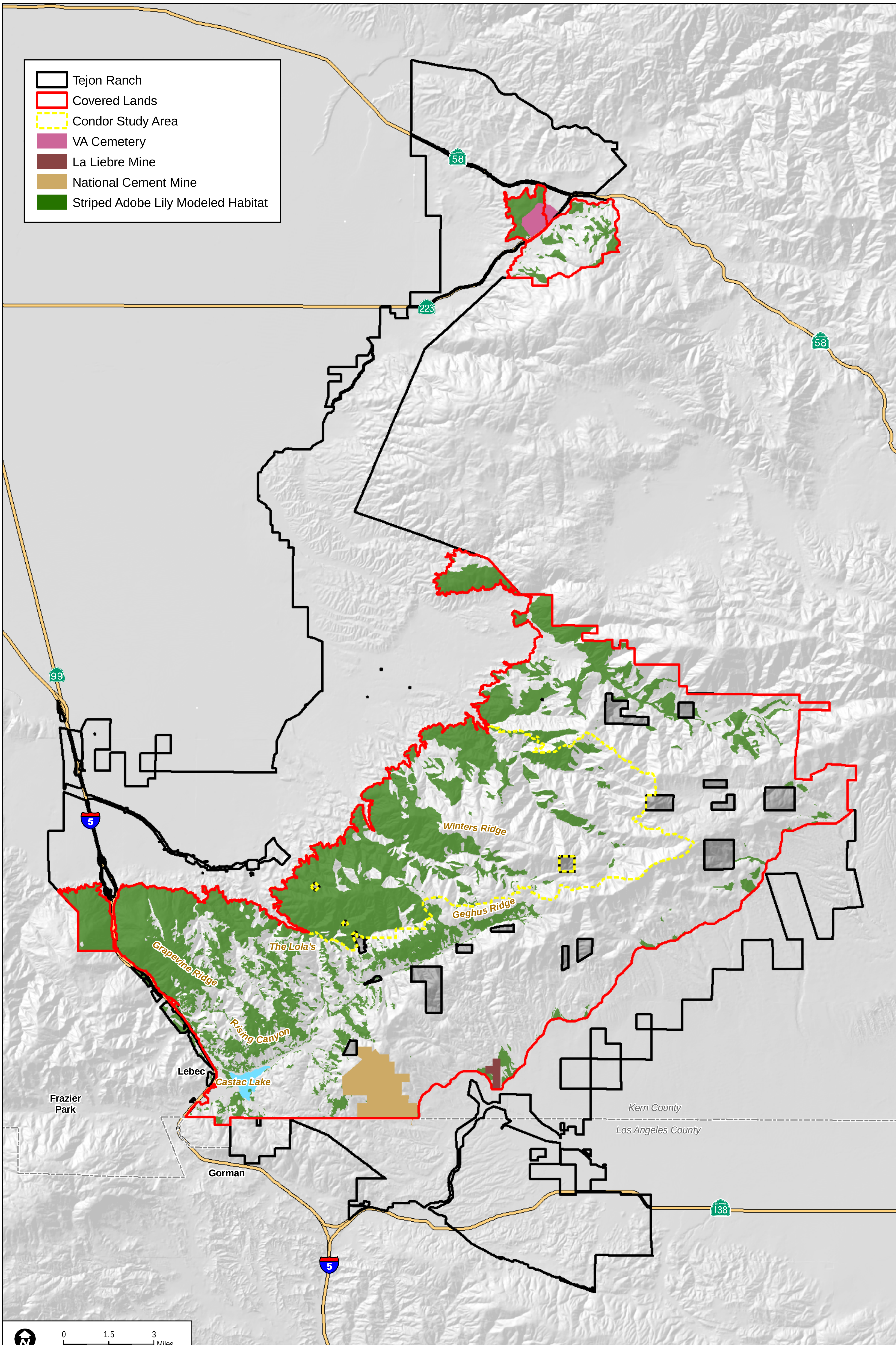
Modeled habitat for Tehachapi buckwheat in the study area includes chaparral and pinyon pine woodland vegetation communities on gravelly loam, rock outcrops, and rocky loam soils that occur between 4,400 and 5,410 feet amsl. A total of 2,579 acres of modeled habitat for Tehachapi buckwheat was identified and mapped (Figure 3.1-33).

3.1.8.7 Tejon Poppy

Status and Distribution

Tejon poppy (*Eschscholzia lemmonii* ssp. *kernensis*) has no Federal or state designation, but has a CRPR of 1B.1 species and a California Heritage Element Ranking of S1 (California Department of Fish and Game 2010). Tejon poppy is known only from Kern County from 58 occurrences in the CNDDB (California Department of Fish and Game 2011). Collections of this plant have been made from Kern County (Specimen Management for California Herbaria 2007).

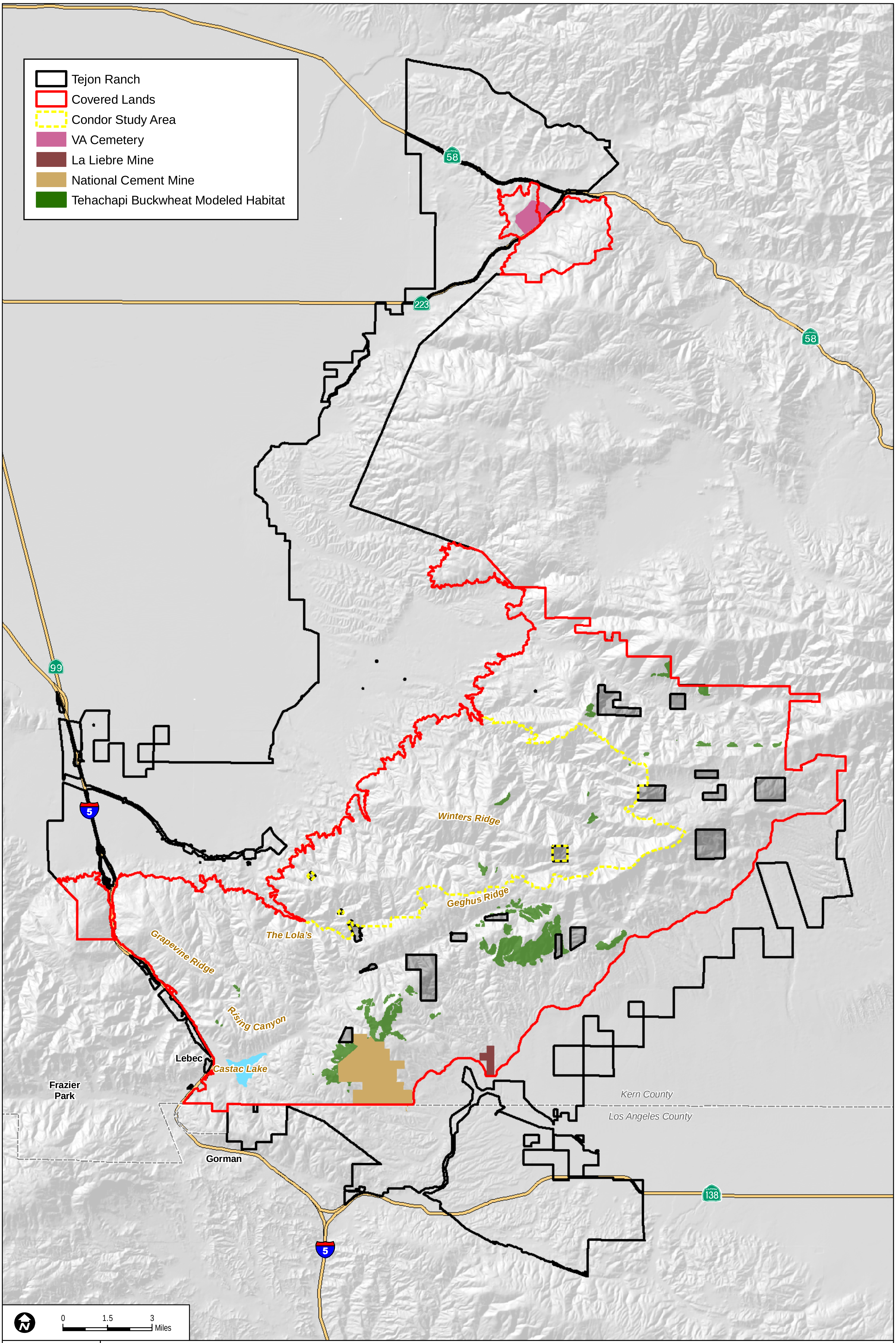
Tejon poppy is presumedto be extant in Elk Hills, but populations documented in older literature reports and collections from Comanche Point, Tejon Hills, Dry Bog Knoll in the Greenhorn Range



SOURCE: TRC 2007

FIGURE 3.1-32

Striped Adobe Lily Modeled Habitat



SOURCE: TRC 2007

FIGURE 3.1-33

Tehachapi Buckwheat Modeled Habitat

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foothills, near the mouth of Salt Creek, south of Maricopa near Devil's Gulch, and in the mesas east of Bakersfield have not been revisited in three or more decades (California Department of Fish and Game 2011, Twisselmann 1967, Cypher 2006).

Habitat Characteristics and Use

Tejon poppy occurs in chenopod scrub and in grassland habitats between 524 and 3,281 feet amsl (California Native Plant Society 2011). Tejon poppy is known to grow on clay soils (Cypher 2006, Twisselmann 1967).

Most of the reported occurrences of Tejon poppy in the CNDDB from Elk Hills are in valley saltbush scrub habitats, with common saltbush (*Atriplex polycarpa*) and nonnative annual grasses such as red brome (*Bromus madritensis* ssp. *rubens*), wild oats (*Avena fatua*), and rat-tail fescue (*Vulpia myuros*) (California Department of Fish and Game 2011). Spiny saltbush (*Atriplex spinifera*) is also listed as an associate of Tejon poppy in these areas. In the 1960s, associates of Tejon poppy recorded at Comanche Point included Kern brodiaea (*Brodiaea terrestris* ssp. *kernensis*), sunset lupine (*Lupinus microcarpus* var. *horizontalis*), and Comanche Point layia (*Layia leucopappa*) (Cypher 2006).

Occurrence in the Study Area

Presence/absence surveys were conducted for Tejon poppy in 2007 in the TMV Planning Area, and were negative (Dudek 2007b). There are no CNDDB records of Tejon poppy in the study area; however, there are numerous CNDDB records for Tejon poppy west of the study area in Kern County (California Department of Fish and Game 2011). Three records are from Tejon property, but are outside the study area. The nearest occurrence is approximately 1 mile southwest of the northern section of the study area, and two other occurrences are west of the study area in the Tejon Hills (California Department of Fish and Game 2011, Tejon Ranch Company 2007).

Modeled habitat for Tejon poppy in the study area includes grassland and scrub vegetation communities on all soils that occur between 1,797 and 3,280 feet amsl. A total of 12,672 acres of modeled habitat for Tejon poppy was identified and mapped (Figure 3.1-34).

3.1.9 Other Special-Status Species

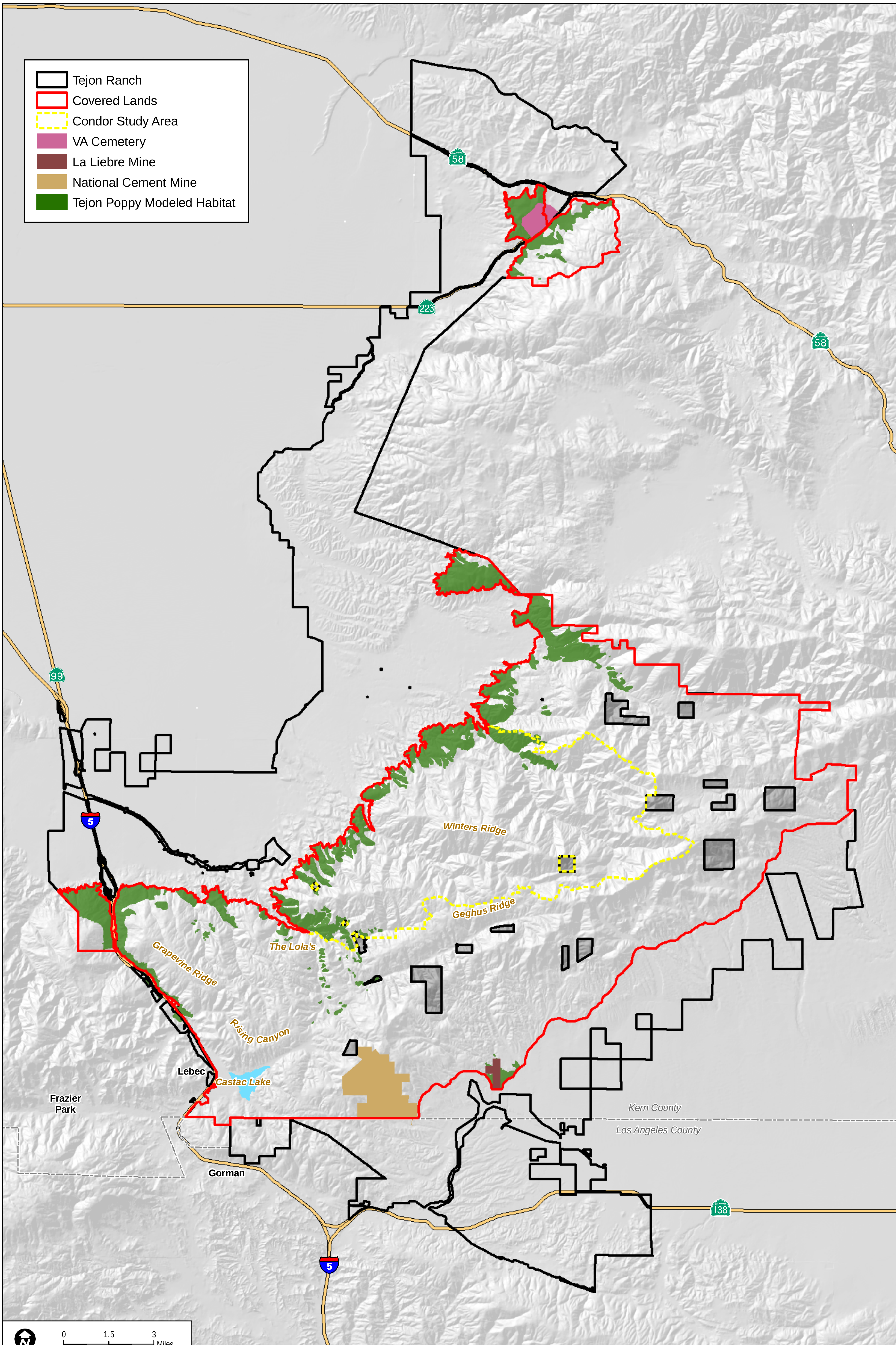
The study area provides potential habitat for a number of additional special-status wildlife species that were evaluated but not proposed for regulatory coverage for one or more of the following reasons:

- The species has some, but low, potential to occur in the study area based on known ranges or specific habitat or life history traits.
- The species has taxonomic uncertainties or life history traits that make regulatory coverage difficult.
- The species may meet the criteria for coverage by the TU MSHCP but is not likely to be affected by the Covered Activities and thus is excluded from coverage.

These species are listed in Table 3.1-5, along with their primary habitat associations and available information on their status in the study area, based on biological surveys conducted in the TMV Planning Area.

Table 3.1-5. Other Special-Status Species Not Proposed for Coverage, Occurring or with Potential to Occur in the Study Area

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CRPR Status[3]	Habitat Associations	Known Range in California Elevation (feet amsl)	Status in the Study Area
California spotted owl	*Strix occidentalis occidentalis*	FS BLM BCC	SSC		Steep-walled canyons that are densely wooded with mixtures of oaks and conifers, ranging into mixed coniferous forest in the southern mountains but always requiring some dense stands of oaks.	In the southern Cascade Range and northern Sierra Nevada from near Burney (Pit River); Shasta County, California; south through the remainder of the western Sierra Nevada and Tehachapi Mountains to Lebec, Kern County. Found locally east of the Sierra Nevada crest. In the California Coast Ranges from Monterey County south to Santa Barbara County, then in the Transverse Range and Peninsular Ranges south to Sierra San Pedro Martir in northern Baja California.	Observed in TMV Planning Area as single resident male and single resident female. Not expected to breed in the study area.
Cooper's hawk	*Accipiter cooperii*	None	WL		Dense stands of live oak, riparian woodlands, or other woodland habitats near water.	Breeding resident in California throughout most woodlands and present year round, except for the Colorado River and desert areas where it no longer breeds. Also occurs in California as a spring and fall migrant and as a winter resident. Ranges from sea level to above 9,000 feet amsl.	Four nests were observed in 2007 in the TMV Planning Area. Expected to occur in similar distribution in the study area in suitable habitat.
Long-eared owl	*Asio otus*	None	SSC (nesting)		Riparian, live oak thickets, other dense stands of trees, edges of coniferous forest.	Uncommon yearlong resident throughout California, except the Central Valley and southern California deserts, where it is an uncommon winter visitor. Occurs from sea level to higher elevations of the Sierra Nevada.	2007 surveys in TMV Planning Area were negative. However, suitable riparian and forested areas are present in the study area and the species is considered to have moderate potential to nest and forage on site.



SOURCE: TRC 2007

FIGURE 3.1-34

Tejon Poppy Modeled Habitat

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Common Name	Scientific Name	Federal Status[1]	State Status[2]	CRPR Status[3]	Habitat Associations	Known Range in California Elevation (feet amsl)	Status in the Study Area
Northern goshawk	*Accipiter gentilis*	FS BLM	SSC (nesting) CDF		Nesting habitat: densely forested woodlands and riparian areas.	Breeds in North Coast Ranges through Sierra Nevada, Klamath, Cascade, and Warner mountains, in Mt. Pinos and San Jacinto, San Bernardino, and White mountains. Remains in breeding areas year-round as an uncommon resident. Prefers middle and higher elevations, and mature, dense conifer forests. Casual in winter along the north coast, throughout foothills, and in northern deserts, where it may be found in pinyon-juniper and low-elevation riparian habitats.	Observed in Bear Trap Canyon during previous surveys. Not detected during 2007 focused surveys in TMV Planning Area. Low potential to nest in the study area.
Northern harrier	*Circus cyaneus*	None	SSC (nesting)		Open wetlands (nesting), pasture, old fields, dry uplands, grasslands, rangelands, coastal sage scrub.	Breeds from sea level to 5,700 ft amsl in the Central Valley and Sierra Nevada. Permanent resident of the northeastern plateau and coastal areas; less common resident of the Central Valley. Widespread winter resident and migrant in suitable habitat.	Observed in 2007 in TMV Planning Area, but nesting not confirmed. Moderate potential to nest in the study area.

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CRPR Status[3]	Habitat Associations	Known Range in California Elevation (feet amsl)	Status in the Study Area
Osprey	*Pandion haliaetus*	None	WL CDF		Large trees, snags, dead-topped trees in open forest for cover and nesting. Forages in large bodies of water.	Breeds in northern California from Cascade Ranges south to Lake Tahoe, and along the coast south to Marin County. Regular breeding sites include Shasta Lake, Eagle Lake, Lake Almanor, other inland lakes and reservoirs, and northwest river systems. An uncommon breeder along southern Colorado River and uncommon winter visitor along the coast of southern California.	Observed in 2007 in TMV Planning Area but nesting not observed. Low potential to nest in the study area.
Prairie falcon	*Falco mexicanus*	BCC	WL		Grassland, savannahs, rangeland, agriculture, desert scrub, alpine meadows; nest on cliffs or bluffs.	Uncommon permanent resident that ranges from southeastern deserts northwest throughout the Central Valley and along the inner Coast Ranges and Sierra Nevada.	Observed in 2007 in TMV Planning Area, nesting and foraging on site. Nesting habitat is limited outside TMV Planning Area, but the species has high potential to forage in the study area.
Southern California rufous-crowned sparrow	*Aimophila ruficeps canescens*	None	WL		Moderate to steep, rocky hillsides with coastal sage scrub and chaparral.	Restricted to a narrow belt of semiarid coastal sage scrub and sparse chaparral from Santa Barbara south to the northwestern corner of Baja California.	Not observed in TMV Planning Area and considered to have low potential to occur in the study area.
Yellow-breasted chat	*Icteria virens*	None	SSC (nesting)		Dense, relatively wide riparian woodlands and thickets of willows, vine tangles, and dense brush.	An uncommon summer resident and migrant in coastal California and in foothills of the Sierra Nevada. Found up to approximately 4,800 feet amsl in valley foothill riparian, and up to 6,500 ft amsl east of the Sierra Nevada in deserts.	Observed in 2007 in TMV Planning Area. High potential to nest in suitable habitat in the study area.

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CRPR Status[3]	Habitat Associations	Known Range in California Elevation (feet amsl)	Status in the Study Area
American badger	*Taxidea taxus*	None	SSC		Dry, open treeless areas, grasslands, coastal sage scrub.	Uncommon, permanent resident found throughout most of the state, except in the northern North Coast area.	Observed in 2007 in TMV Planning Area and expected to occur in the study area in suitable habitat.
San Bernardino ringneck snake	*Diadophis punctatus modestus*	FS	None		Moist habitats, including woodlands, hardwood and conifer forest, grassland, sage scrub, chaparral, croplands/hedgerows, and gardens.	San Bernardino ringneck snake subspecies occur along the southern California coast from the Santa Barbara area south to northern San Diego County, and inland into the San Bernardino Mountains. However, the genus *Diadophis* is in need of taxonomic study, and the six recognized subspecies in California are nearly genetically indistinguishable (NatureServe 2007).	Not observed in 2007 in TMV Planning Area but has moderate potential to occur in suitable habitat in the study area.
Silvery legless lizard	*Anniella pulchra pulchra*	FS	SSC		Loose soils (sand, loam, humus) in coastal dune, coastal sage scrub, woodlands, and riparian habitats.	From northern Contra Costa County south to northwestern Baja California. Occurs in scattered locations in the San Joaquin Valley and along the southern Sierra Nevada mountains, including the Tehachapi Mountains, and at the edge of the deserts in Walker Pass, Morongo Valley, Whitewater, and the east slope of the Peninsular Ranges. Also in the western Mojave Desert. Sea level to 6,000 feet amsl.	Not confirmed in 2007 in TMV Planning Area, but presence is assumed in the study area due to suitable habitat and range documented for this region.

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CRPR Status[3]	Habitat Associations	Known Range in California Elevation (feet amsl)	Status in the Study Area
Western pond turtle	*Actinemys (Emys) marmorata*	BLM FS	SSC		Riparian, wetland, and permanent aquatic habitat with deep pools.	Throughout California, west of the Sierra-Cascade crest. Absent from desert regions, except in the Mojave Desert along the Mojave River and its tributaries. From sea level to 4,690 feet amsl.	Not observed in 2007 in TMV Planning Area. Low potential to occur in the study area due to lack of suitable habitat.
Aromatic canyon gooseberry	*Ribes menziesii* var. *ixoderme*	None	None	1B.2	Chaparral and cismontane woodland (CNPS 2011) Rare in the blue (Douglas) oak woodland on the east slope of Blue Mountain in the Greenhorn Range and in Caliente Canyon at 2,300 ft amsl elevation (Twisselmann 1967).	Sierra Nevada foothills in northern Kern, central Tulare, and southern Fresno counties. Occurs from 2,001 to 3,801 feet amsl.	79 occurrences totaling 700 individuals observed in TMV Planning Area. High potential to occur elsewhere in the study area.
Calico monkeyflower	*Mimulus pictus*	None	None	1B.2	Granitic soils, disturbed areas in broad leafed upland forest, cismontane woodland (California Native Plant Society 2011). Endemic to foothills from Tejon Canyon north to Porterville. Occasionally in blue (Douglas) oak woodland, colonizes in bare ground around chaparral gooseberry patches (where grazed heavily by rabbits) or granite outcrops (Twisselmann 1967).	Central Kern and Tulare counties. Occurs from 328 to 4,265 feet amsl.	Nine occurrences totaling from 700 to 1,300 individuals observed in TMV Planning Area. High potential to occur elsewhere in the study area.
Delicate bluecup	*Githopsis tenella*	None	None	1B.3	Mesic areas in chaparral, cismontane woodland (California Native Plant Society 2011).	Southern Sierra Nevada in Kern and Tulare counties. May also occur in Cholame Hills in Monterey County. Occurs from 3,600 to 6,230 feet amsl.	Not detected but has moderate potential to occur on Covered Lands. One CNDDB (CDFG 2008c) record outside but adjacent to northeast corner of TMV Planning Area.

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CRPR Status[3]	Habitat Associations	Known Range in California Elevation (feet amsl)	Status in the Study Area
Flax-like monardella	*Monardella linoides* ssp. *oblonga*	None	None	1B.3	Lower montane coniferous forest, pinyon and juniper woodland, upper montane coniferous forest (California Native Plant Society 2011).	Southwestern and central Kern County, south-central Tulare County, and northeastern Ventura County. Occurs from 2,950 to 8,100 feet amsl.	Four occurrences totaling from 300 to 600 individuals were observed in TMV Planning Area. High potential to occur elsewhere in the study area.
Golden violet	*Viola purpurea* ssp. *aurea*	None	None	2.2	Sandy soils in Great Basin scrub and pinyon and juniper woodland (California Native Plant Society 2011).	East of Sierra Nevada, Mojave Desert (Jepson Flora Project 2008). Occurs from 3,280 to 5,905 feet amsl.	One occurrence totaling 30 individuals was observed in TMV Planning Area. High potential to occur elsewhere in the study area.
Pale-yellow layia	*Layia heterotricha*	None	None	1B.1	Alkaline or clay soils in cismontane woodland, coastal scrub, pinyon and juniper woodland, and grassland (California Native Plant Society 2011). Restricted to clay, usually of ultra-fine friable (dry bog) clay (Twisselmann 1967).	Coastal counties from Ventura to Fresno and south-central Kern County. Elevations from 980 to 5,590 feet amsl.	Not observed in TMV Planning Area but has moderate potential to occur in the study area.
Palmer's mariposa lily	*Calochortus palmeri* var. *palmeri*	None	None	1B.2	Mesic areas in chaparral, lower montane coniferous forest, and meadows and seeps (California Native Plant Society 2011).	Riverside, southwestern San Bernardino, Kern, Los Angeles, Ventura, Santa Barbara, and San Luis Obispo counties. Occurs from 3,280 to 7,840 feet amsl.	Three occurrences totaling 11 individuals were observed in TMV Planning Area. High potential to occur elsewhere in the study area.
Piute Mountains navarretia	*Navarretia setiloba*	None	None	1B.1	Clay or gravelly loam soils in cismontane woodland, pinyon and juniper woodland, valley and foothill grassland (California Native Plant Society 2011). Rare endemic of heavy soils (Twisselmann 1967).	Central Kern and southern Tulare counties. Occurs from 1,000 to 6,900 feet amsl.	220 occurrences totaling from 35,300 to 93,300 individuals were observed in TMV Planning Area. High potential to occur elsewhere in the study area.

Common Name	Scientific Name	Federal Status[1]	State Status[2]	CRPR Status[3]	Habitat Associations	Known Range in California Elevation (feet amsl)	Status in the Study Area
San Bernardino aster	*Symphyotrichum defoliatum [Aster bernardinus]*	None	None	1B.2	Near ditches, streams, and springs in cismontane woodland, coastal scrub, lower montane coniferous forest, meadows and seeps, marshes and swamps, and vernally mesic areas in grasslands (California Native Plant Society 2011).	Occurs from Kern County south to San Diego County, including Riverside and San Bernardino counties. Occurs from near sea level to 6,700 feet amsl.	16 locations totaling from 6,300 to 12,800 individuals were observed in TMV Planning Area. Also documented from about 1,000 ft amsl west of freeway in 1939 (California Department of Fish and Game 2011). High potential to occur elsewhere in the study area.

Notes:

1 Federal Designations:

BCC U.S. Fish and Wildlife Service Birds of Conservation Concern

BLM Bureau of Land Management sensitive

FS U.S. Forest Service sensitive

2 State Designations:

SSC Species ofSpecial Concern

WL California Department of Fish and Game Watch List

CDF California Department of Forestry & Fire Protection sensitive

3 CRPRs:

List 1B Rare or endangered in California and elsewhere

List 2 Rare, threatened, or endangered in California but more common elsewhere

Threat Extension .1 Seriously endangered in California (over 80% of occurrences threatened/high degree and immediacy of threat).

Threat Extension .2 Fairly endangered in California (20 to 80% occurrences threatened).

Threat Extension .3 Not very endangered in California

3.2 Water Resources

This section describes the surface water, groundwater, wetlands, and water quality in the study area. For this section, the study area includes all surface waters and wetlands within the Covered Lands, their associated watersheds, and the groundwater basins that underlie the Covered Lands.

3.2.1 Surface Water and Groundwater

The study area is located in the Tehachapi Mountain Uplands and experiences a Mediterranean climate, with wet, cool winters and warm, dry summers. Most of the rainfall in the study area occurs from November through April.

3.2.1.1 Watersheds

The study area is generally located at the southern end of the San Joaquin Valley. Most of the watersheds located in the study area drain to the north and terminate in the alluvial soils in the foothills adjacent to the San Joaquin Valley. The northerly draining portions of the study area are in the Tulare Lake Hydrologic Region, a regional watershed designated by the California Department of Water Resources (DWR). The Tulare Lake Hydrologic Region is subject to the jurisdiction of the Central Valley Regional Water Quality Control Board (RWQCB).

Some areas along the southern portion of the study area drain to the southeast toward the Antelope Valley. These southeasterly draining portions of the study area are in the South Lahontan Hydrologic Region designated by DWR and are subject to the jurisdiction of the Lahontan RWQCB.

Figure 3.2-1 identifies the portions of the study area that are located in the Tulare Lake Hydrologic Region and the South Lahontan Hydrologic Region.

3.2.1.2 Surface Water

Surface Drainages

Streams and watercourses in the study area are generally intermittent and sustain flows only after extended wet periods or large storm events. Northerly draining streams include Tejon Creek, El Paso Creek, Tunis Creek, Pastoria Creek, Live Oak Creek, and Grapevine Creek (Figure 3.2-1). The Castac Lake Basin is located at the head of Grapevine Creek and receives inflow from Cuddy Creek to the west and from other drainages to the east, north, and south. Southeasterly draining streams in the study area include Big Sycamore Creek, Little Sycamore Creek, Los Alamos Creek, Oso Creek, and Tentrock Creek (Figure 3.2-1).

Numerous natural springs also exist in the study area, and ponds and reservoirs have been established to provide water for livestock. Tejon Ranchcorp (TRC) currently diverts water from Pastoria Creek, Tecuya Creek, Live Oak Creek, Grapevine Creek, Tunis Creek, Tejon Creek, and El Paso Creek for farming and irrigation purposes, pursuant to permits issued by the State Water Resources Control Board (SWRCB) and the California Department of Fish and Game (CDFG). These diversion activities are limited to the operation and maintenance of a single weir structure, a water intake and conveyance pipe, and a flow meter within Tejon Creek. Two additional diversions are located immediately adjacent to the study area, one on El Paso Creek and one on Tejon Creek.

Castac Lake

Castac Lake is an approximately 400-acre natural lake located in the southwestern portion of the study area, east of Interstate 5 (I-5) in the Castac Valley (Figure 3.2-1). Castac Lake is the only naturally occurring lake in the study area and has a tributary drainage area of approximately 50 to 60 square miles, including Cuddy Creek (Pacific Advanced Civil Engineering 2006).

Castac Lake formed approximately 10,000 years ago as a result of tectonic activity on the Garlock Fault and other smaller faults. The lake bed elevation is 3,480 feet above mean sea level (amsl). The lake is largely unvegetated, although shallow areas at the lake perimeter support fresh water, emergent wetlands, and wet meadows. The lake has experienced cyclical periods of wet and dry conditions, and has been dry several times since 1940, most recently in 1989. Since 2002, TRC has managed the lake levels to control flooding and to improve water quality, and has periodically used groundwater to augment surface flows from the surrounding watershed, as necessary.

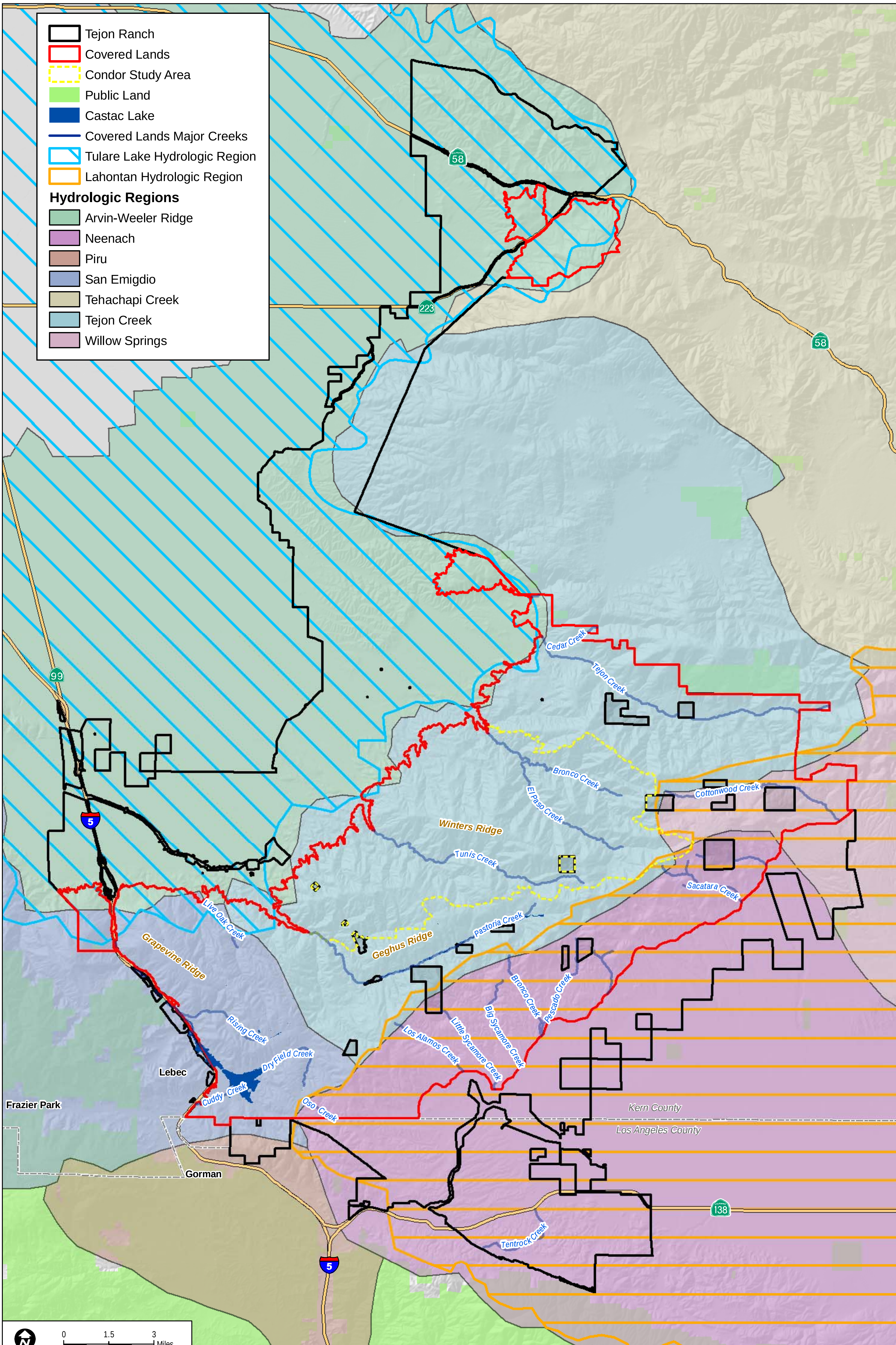
3.2.1.3 Groundwater

Two large groundwater aquifers and several smaller subbasins are located to the north and south of the study area (Figure 3.2-2). The largest aquifer to the north is the San Joaquin Valley Groundwater Basin, which generally encompasses the entire San Joaquin Valley plain. DWR has identified several subbasins in the San Joaquin Valley Groundwater Basin, of which the Kern County Groundwater Basin, the White Wolf Subbasin, and the Springs Subbasin are most proximate to the study area. All of these basins and subbasins are subject to the jurisdiction of the Central Valley RWQCB.

The Kern County Groundwater Basin has a total surface area of approximately 1.95 million acres, or 3,040 square miles, and an estimated total storage capacity of 40 million acre-feet (California Department of Water Resources 2003). Recharge of the basin results from surface water seepage along the approximately 20 watercourses that drain into the basin and from agriculture-related land uses. The basin’s storage was historically depleted by groundwater pumping up to approximately 1970, when imported state and Federal water project supplies reduced the need for groundwater. Since that time, groundwater levels have generally remained stable or have increased, particularly in the southern portions of the Kern County Groundwater Basin located near the study area (Wheeler Ridge-Maricopa Water Storage District 2003).

The White Wolf Subbasin comprises a distinct segment of the Kern County Groundwater Basin determined by the effects of the White Wolf Fault to the north and the Springs Fault to the south. The surface area of the White Wolf Subbasin is approximately 52,000 acres. Most of the wells in the subbasin are approximately 800 to 1,400 feet deep. Surface water recharge into the White Wolf Subbasin results naturally from stream flow seepage into permeable alluvial sands and gravels, primarily from Tejon, El Paso, Pastoria, and Grapevine Creeks. Seepage of irrigation water from earth-lined canals, ditches, reservoirs, and from agricultural lands that overlie the subbasin also provides a source of recharge. In general, water levels in the White Wolf Subbasin have increased approximately 50 to 100 feet since the 1970s due to reduced groundwater use and return flows from state and Federal water projects (Wheeler Ridge-Maricopa Water Storage District 2003).

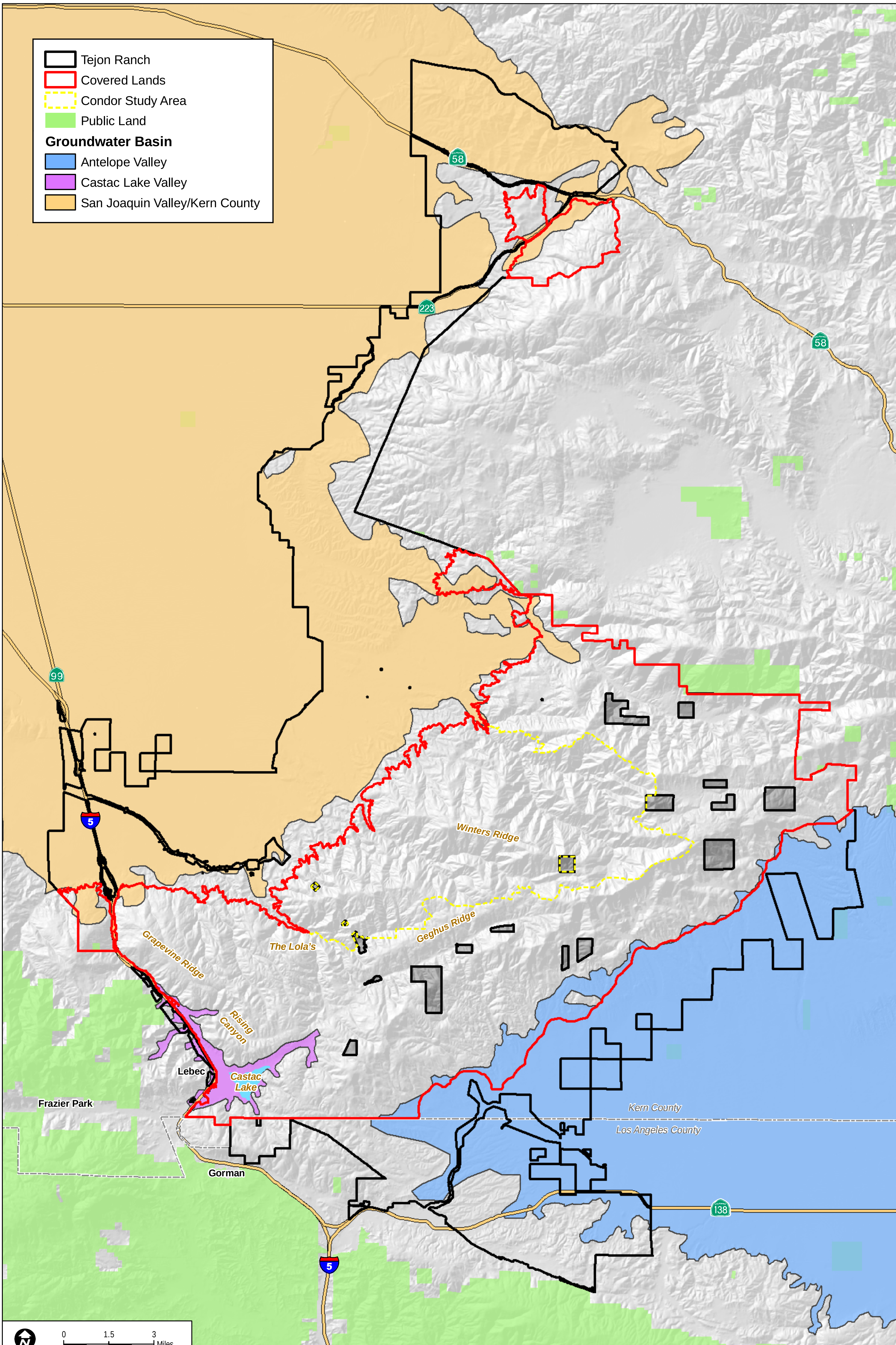
The Springs Subbasin is located entirely within Tejon Ranch (but not under the study area) and is separated from the White Wolf Subbasin by the Springs Fault. The Springs Subbasin encompasses approximately 4,300 acres and is primarily recharged by flows from Tejon, El Paso, and Tunis Creeks. In recent years, TRC has not pumped groundwater from the Springs Subbasin for irrigation,



SOURCE: TRC 2007
USGS 2011

FIGURE 3.2-1

Hydrologic Regions and Major Watercourses Within the Covered Lands



SOURCE: TRC 2007
California Department of Water 2011

FIGURE 3.2-2

Groundwater Basins Adjacent to and Within the Covered Lands

and groundwater levels have been relatively high (Wheeler Ridge-Maricopa Water Storage District 2003).

The largest aquifer to the south of the study area is the Antelope Valley Groundwater Basin (designated as Basin 6-44 in California Department of Water Resources 2003) (Figure 3.2-2). The Antelope Valley Groundwater Basin encompasses approximately 960 square miles and is bounded on the northwest by the southern edge of the Garlock Fault zone along the base of the Tehachapi Mountains, and on the southwest by the San Andreas Fault zone at the base of the San Gabriel Mountains. On the east, the basin is bounded by ridges, buttes, and low hills that form a surface and groundwater drainage divide, and on the north by the Fremont Valley Groundwater Basin (designated as Basin 6-46 in California Department of Water Resources 2003). The Antelope Valley Groundwater Basin has been subject to an ongoing adjudication since approximately 2005 to determine groundwater rights. The allocation of groundwater rights and a determination of groundwater basin yield have not yet been determined by the adjudication court. In general, the study area does not extend to the lower foothills and alluvial plains along the southern slopes of the Tehachapi Mountains that directly overlie the Antelope Valley Groundwater Basin.

Several smaller groundwater basins have also been identified by DWR adjacent to or in the Tehachapi Mountains and under or near the study area. Specifically, portions of the study area overlie the Castac Lake Valley Basin (designated as Basin 5-29 California Department of Water Resources 2003)(Figure 3.2-2), which is subject to the jurisdiction of the Central Valley RWQCB. The Castac Lake Valley Basin is generally centered on Castac Lake and is bounded by I-5) to the west, mountains to the east and south, and the Grapevine Creek Valley to the north. Groundwater has historically been extracted from the Castac Lake Valley Basin by TRC for irrigation, use at ranch headquarters, and for lake management purposes. The study area does not overlie a significant portion of any other aquifer or subbasin identified by DWR (California Department of Water Resources 2003).

3.2.2 Wetlands

The study area contains wetlands and stream riparian areas that may be regulated by the U.S. Army Corps of Engineers (USACE), the SWRCB, and/or CDFG. A comprehensive jurisdictional delineation of the entire study area has not been conducted, although a jurisdictional delineation of the TMV Planning Area was completed in 2008 (Impact Sciences 2008). The jurisdictional delineation of the TMV Planning Area identified 642 acres of waters of the United States, including Castac Lake, subject to regulation by USACE under Section 404 of the Clean Water Act (CWA), and 84.7 acres of additional wetlands/riparian features subject to state regulation by the SWRCB and/or CDFG.

Outside the TMV Planning Area, it is likely that jurisdictional waters or wetlands would occur within canyon bottoms at lower elevations, where streams typically exhibit an ordinary high water mark, and where water may collect for more than short periods of time. Certain areas adjacent to or within Castac Lake, Cuddy Creek, and Dry Fields Creek likely contain waters or wetland areas that could be subject to the jurisdiction of USACE, the Central Valley RWQCB, or CDFG. State or Federal jurisdictional areas and aquatic vegetation are also likely to be present in portions of Pastoria Creek, Tunis Creek, El Paso Creek, Cottonwood Creek, Los Alamos Creek, Tejon Creek, and downstream of Castac Lake within Grapevine Creek.

3.2.3 Water Quality

3.2.3.1 Land Uses Affecting Water Quality in the Study Area

The Central Valley RWQCB adopted the Water Quality Control Plan for the Tulare Lake Basin in the southern San Joaquin Valley and the portions of the Tehachapi Mountains in the Tulare Lake Hydrologic Region (Tulare Lake Basin Plan) (Central Valley Regional Water Quality Control Board 2004). Similarly, the Lahontan RWQCB adopted the Water Quality Control Plan for the Lahontan Region, North and South Basins, that includes the portions of the study area within the South Lahontan Hydrologic Region (Lahontan Basin Plan) (Lahontan Regional Water Quality Control Board 2005). The following land uses are identified in the Tulare Lake and/or Lahontan Basin Plans as land uses that may degrade water quality in the region.

- **Mineral Extraction Activities.** In association with the production of Portland cement by the National Cement Company on its leased site (2,500 acres in the study area), hazardous substances attributed to the use of solvents were discovered in the soil and groundwater, and this contamination has been the subject of several cleanup and abatement orders. The contamination has been remediated or is undergoing remediation under the supervision of the California Department of Toxic Substances Control (DTSC) and Lahontan RWQCB. Contaminants associated with the manufacturing of Portland cement that could impair water quality include chlorinated hydrocarbon compounds, cement kiln dust, various fuels, and sediment.
- **Farming.** Irrigated farming in the study area is limited due to steep terrain and unproductive soil. On the Covered Lands, cultivated acreage has been occasionally maintained near Castac Lake; TRC planted approximately 11 acres of vineyards in the general vicinity of the lake, and maintains a small apple orchard. Potential contaminants from farming activities include pesticides, herbicides, and nutrients.
- **Livestock Grazing.** Sheep and cattle grazing occur on approximately 240,000 acres of the ranch, including most of the study area. The number of cattle varies from 8,000 to 17,000 and the historic average on the Covered Lands is approximately 14,500. Sheep are occasionally grazed on the eastern part of the ranch in the study area. Numerous fences, watering systems, corrals, and other grazing-related improvements are located throughout the study area. Grazing animals and naturally occurring wildlife contribute nutrients, bacteria, and pathogens to surface waters. Overgrazing can also contribute to erosion and lead to impairment of downstream surface waters due to excessive sedimentation.
- **Groundwater Use.** Pumping of groundwater can degrade groundwater quality, adversely affect an aquifer's physical integrity, and lower basin water levels. Groundwater use in the study area is limited to wells in the Castac Lake Valley Basin (DWR Basin 5-29). The Castac Lake Valley Basin is unadjudicated and has not been documented to be depleted or in overdraft (California Department of Water Resources 2003). TRC has historically used groundwater from this basin to serve the ranch headquarters complex; for irrigation of pasture, landscaping, and agricultural uses (e.g., vineyards, apple orchards, etc.); for irrigation of Tejon sports fields, El Tejon School grounds and facilities, and firefighting purposes; and to maintain Castac Lake. No operating wells or significant groundwater extraction activity occurs in other portions of the study area.

Water diversion activities are currently limited by the Ranchwide Agreement, so that there would be no significant expansion of groundwater extraction practices as of June 17, 2008, the date of the Ranchwide Agreement, and no major alterations or improvements of the ranch surface for water storage, including water storage in underground aquifers (except that stock ponds may be used for cattle grazing).

3.2.3.2 Surface Water Quality

The Tulare Lake Basin Plan designates the northerly draining waters in the study area as part of the regional Westside streams network. These streams are hydrologically and geologically distinct from the watercourses that drain from the Sierra Nevada, which the basin plan designates as Eastside streams. The Westside streams primarily drain marine sediment formations and typically contain mineralized waters, although water quality varies by stream reach.

The Tulare Lake Basin Plan has designated several beneficial uses for the Westside streams, including the following:

- AGR: Agricultural supply waters used for farming, horticulture, or ranching.
- GWR: Groundwater recharge for natural or artificial recharge of groundwater.
- IND: Industrial service supply for activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
- PRO: Use of water for industrial activities that depend primarily on water quality.
- RARE: Waters that support rare, threatened, or endangered species and associated habitats.
- REC-1: Water contact recreation involving body contact with water and during which ingestion is reasonably possible.
- REC-2: Noncontact water recreation for activities in proximity to water, but not involving body contact.
- WARM: Uses of water that support warm water ecosystems, including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
- WILD: Wildlife habitat waters that support wildlife habitats.

The study area contains no water bodies for which the Central Valley RWQCB has determined that beneficial uses have been impaired, or that require total maximum daily load (TMDL) allocations or other water quality corrective measures (Wheeler Ridge-Maricopa Water Storage District 2003, Central Valley Regional Water Quality Board 2011, p.9). In general, water quality information for the westside streams identified in the Tulare Lake Basin Plan that occur in the study area is not well developed as the streams have not been extensively characterized. Available data indicate generally good water quality in most of the streams during periods of flow. Reported total dissolved solids (TDS) concentrations in local creeks, such as Cuddy, Silver, Pastoria, and Grapevine Creeks, range from approximately 300 to 700 milligrams per liter (mg/L) (Geosyntec 2008). Periodic water quality tests by TRC and others within these streams have not identified any water quality exceedences[1], and quality has been sufficient for past and current uses of local creek water on TRC lands (Geosyntec 2008).

[1] Based on U.S. Environmental Protection Agency (EPA) standards for dissolved metals (rather than total metals) to measure compliance with aquatic life water quality standards.

Castac Lake has also been tested for water quality in the past and those results were examined by the Central Valley RWQCB in 2011. The Central Valley RWQCB found that although there are elevated levels of aluminum (150 to 700 μg/L), arsenic (50 to 150 μg/L) and zinc (100 μg/L), those levels do not exceed the levels that preserve beneficial uses (Pacific Advance Civil Engineering 2006, Central Valley Regional Water Quality Control Board 2011). Further, constituents of concern such as arsenic, boron, selenium and aluminum in Castac Lake are derived from the surrounding watershed soils and represent the natural condition. Constituents concentrate during drought cycles, and are flushed from the lake during periods of above average rainfall (Central Valley Regional Water Quality Control Board 2011).

The Lahontan Basin Plan lists existing or potential beneficial uses of major water bodies in the Antelope Valley. None of the southeast-draining waters in the study area are identified as major water bodies in the Lahontan Basin Plan. Table 2-3 of the basin plan identifies beneficial uses for certain minor surface waters within the Antelope Valley Basin, including the southeast-draining streams within the study area. These beneficial uses include the following:

- MUN: Community, military, or individual water supply systems including, but not limited to, drinking water supply.
- AGR: Agricultural supply waters used for farming, horticulture, or ranching.
- GWR: Groundwater recharge for natural or artificial recharge of groundwater.
- FRSH: Natural or artificial maintenance of surface water quantity or quality (e.g., salinity).
- REC-1: Water contact recreation involving body contact with water and during which ingestion is reasonably possible.
- REC-2: Non-contact water recreation for activities in proximity to water, but not involving body contact.
- COMM: Commercial or recreational collection of fish or other organisms.
- COLD: Cold freshwater habitat to support cold water ecosystems.
- WILD: Wildlife habitat waters that support wildlife habitats.
- RARE: Waters that support rare, threatened, or endangered species and associated habitats.
- SPWN: High-quality aquatic habitats suitable for reproduction and early development of fish.

Water quality data for the minor surface waters that occur in the study area under the Lahontan Basin Plan is limited. The California Aqueduct traverses through the study area and is regularly monitored, but there is no hydrological flow from the study area into the aqueduct, and the monitoring data is not indicative of naturally occurring stream water quality in the area. Detailed water quality data for Oso Creek and other southeast-draining streams in the study area are generally not available. Oso Creek, Los Alamos Creek, and the other southeast-draining waters in the study area are ephemeral drainages that terminate in the Antelope Valley floor to the northeast of the study area. During large rainfall events, these drainages are likely to carry a high sediment load, indicated by elevated total suspended solids (TSS) and turbidity, due to the dirt roads, steep slopes, gullied land, and exposed silty and sandy soils in the watershed.

Water quality data is available for discharges to the Los Alamos Creek watershed from the National Cement plant. The facility is subject to certain waste discharge requirements administered by Lahontan RWQCB and the California General Industrial Permit. These requirements affect cement kiln dust waste piles, certain groundwater pollution remedial actions, and stormwater discharges from the facility. This facility is at the edge of the study area, downstream, and most of the southeast-draining waters within the study area are located above or are hydrologically isolated from the National Cement facilities.

3.2.3.3 Groundwater Quality

As discussed in Section 3.2.1.3, Groundwater, the study area overlies a portion of the Castac Lake Valley Basin. The Tulare Lake Basin Plan identifies the following beneficial uses for basins that include the Castac Lake Valley Basin:

- AGR: Agricultural supply waters used for farming, horticulture, or ranching.
- IND: Industrial service supply for activities that do not depend primarily on water quality, including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, or oil well repressurization.
- MUN: Community, military, or individual water supply systems including, but not limited to, drinking water supply.

DWR Bulletin 118 (California Department of Water Resources 2003) states that groundwater quality in Basin 5-29 has not been generally characterized. DWR reports that average TDS is 583 mg/L, with a range of 570 to 605 mg/L from three wells in the basin. Fluoride was reported by the Lebec Water District to be slightly above the state maximum concentration levels in a sample from one well (California Department of Water Resources 2003).

3.3 Air Quality

This section describes the air quality conditions in the study area, which includes the San Joaquin Valley Air Basin (SJVAB), the Mojave Desert Air Basin (MDAB), and the South Coast Air Basin (SCAB). Global climate change is discussed in Section 3.9, Climate Change and Greenhouse Gases.

3.3.1 Regional Air Basins

The California Air Resources Board (CARB) has divided California into 15 regional air basins, based on topographic features. Some basins are true basins, that is, valleys surrounded by mountains. The Covered Lands are located in two air basins: the SJVAB (93,118 acres) and the MDAB (46,668 acres), and are adjacent to the SCAB (Figure 3.3-1).[1] General geographic characteristics of each air basin are discussed below.

3.3.1.1 San Joaquin Valley Air Basin Characteristics

The SJVAB is approximately 250 miles long, averages 80 miles wide, and is the second largest air basin in the state. The basin is defined by the Sierra Nevada in the east, the Coast Ranges in the west, and the Tehachapi Mountains in the south. The valley is basically flat with a slight downward gradient to the northwest.

The SJVAB is characterized by warm, dry summers and cooler winters. High summer temperatures often exceed 100°F, with average temperatures in the lower 90s in the northern valley and the high 90s in the south. Temperatures of 32°F and below occur about 22 days per year. Nearly 90% of the annual precipitation falls in the six months between November and April.

Winds tend to blow parallel to the valley and mountain range orientation. In spring and early summer, thermal low-pressure systems develop over the interior basins east of the Sierra Nevada mountain range and an area of high pressure moves northward. These developments and the topography of the area produce relatively strong northwesterly winds in the spring and early summer. To the south, steady winds quickly disperse air pollutants.

Air pollutants in the SJVAB can be transported to the MDAB as a result of prevailing wind patterns, primarily from June through September. This is particularly relevant with respect to ozone (O_3), but can also occur to a lesser extent with particulate matter less than 2.5 microns in diameter ($PM_{2.5}$) (California Air Resources Board 2009, WZI 1994, Sonoma Technology 2006).

3.3.1.2 Mojave Desert Air Basin Characteristics

The MDAB includes the desert portions of Los Angeles, Kern, San Bernardino, and Riverside Counties. Most of this area is commonly referred to as the high desert because elevations range from approximately 2,000 to 5,000 feet above mean sea level (amsl). The MDAB is generally above the regional inversion layer and experiences relatively good dispersion conditions.

[1] A total of 114 acres of the 93,118 acres in the San Joaquin Valley Air Basin may appear to be in the South Coast Air Basin. Mapping of the air basins shows a small part of the extreme southern edge of the Covered Lands in the South Coast Air Basin. This land was once in Los Angeles County but was transferred to Kern County. The mapping has not been changed, but South Coast Air Quality Management District personnel have stated that the South Coast Air Basin does not include any Kern County land (Smith 2009).

The MDAB is characterized by extreme temperature fluctuations, strong seasonal winds, and clear skies. The average temperature is approximately 60°F, with summertime temperatures occasionally exceeding 100°F, and wintertime temperatures occasionally dropping below 25°F. Average wind speeds are approximately 9 miles per hour, with peak speeds over 30 miles per hour.

With respect to ozone, the greatest air pollution effects throughout the MDAB occur from June through September. This condition is generally attributed to the large amount of pollutant transport from the SCAB and the SJVAB to the MDAB (California Air Resources Board 2009, WZI 1994, Sonoma Technology 2006). Transport of $PM_{2.5}$ into the MDAB from adjacent air basins can also occur, though transport of ozone is generally considered a greater concern due to its gaseous form.

3.3.1.3 South Coast Air Basin Characteristics

The SCAB includes the nondesert portions of Los Angeles, San Bernardino, and Riverside Counties, and all of Orange County. The basin encompasses 6,745 square miles and is bounded by the Pacific Ocean to the west, and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east.

The climate of the SCAB is semi-arid, and characterized by warm summers, mild winters, infrequent seasonal rainfall, moderate daytime onshore breezes, and moderate humidity. The average annual temperature varies little throughout the SCAB, averaging approximately 75°F. However, with a less pronounced oceanic influence, the eastern inland portions of the SCAB show greater variability in annual minimum and maximum temperatures. All portions of the SCAB have had recorded temperatures over 100°F in recent years. January is usually the coldest month at all locations, while July and August are usually the hottest months of the year. Precipitation in the SCAB is typically 9 to 14 inches annually and is rarely in the form of snow or hail due to typically warm weather.

Although the SCAB has a semi-arid climate, air near the surface is generally moist because of the presence of a shallow marine layer. With very low average wind speeds, there is a limited capacity to disperse air contaminants horizontally. The dominant daily wind pattern is an onshore daytime breeze of 8 to 12 miles per hour and an offshore nighttime breeze of 3 to 5 miles per hour. The typical wind flow pattern fluctuates only with occasional winter storms or strong northeasterly Santa Ana winds from the mountains and deserts northeast of the SCAB.

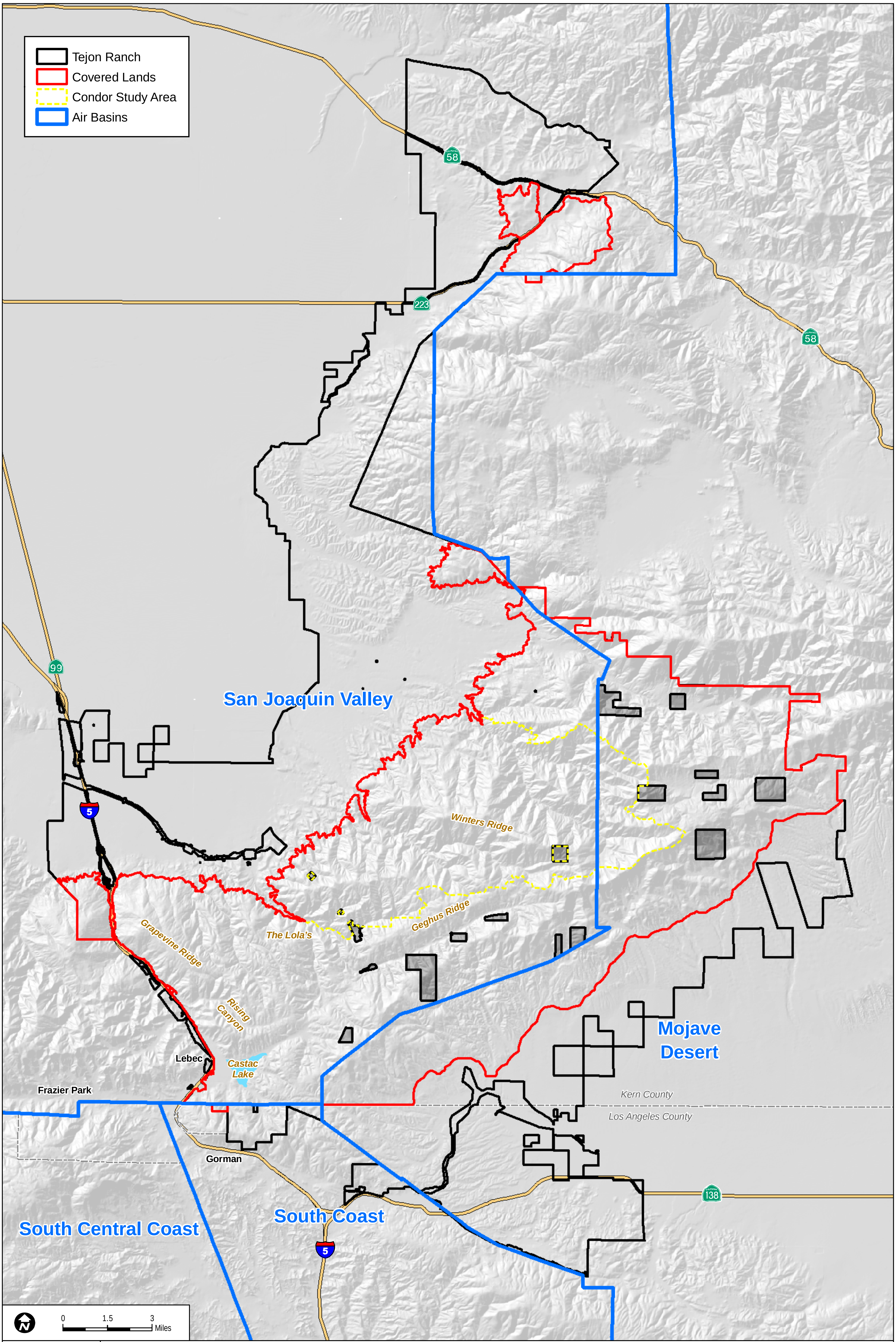
As discussed above, ozone transport from the SCAB to the MDAB can occur. $PM_{2.5}$ can also be transported to the MDAB, though ozone is generally considered more of a concern due to its gaseous form.

3.3.1.4 Pollutants

Federal and/or California ambient air quality standards have been set for all of the following pollutants (which include the ozone precursors) pursuant to the Federal Clean Air Act or the California Health and Safety Code. Additionally, toxic air contaminants are discussed in this analysis because they have potential for concern in the study area. Data for pollutants monitored in the study area by CARB are presented in Section 3.3.3, Ambient Air Monitoring Data.

Ozone

Ozone (O_3) occurs in two layers of the atmosphere, the troposphere, and the stratosphere. The troposphere starts at ground level and wraps the earth's surface. In this layer, ground-level or "bad" ozone is an air pollutant that damages human health, vegetation, and many common materials. It is a key ingredient of urban smog. The troposphere extends to a level approximately 10 miles above ground level until it meets the second atmospheric layer, the stratosphere. The stratospheric or



SOURCE: Air Resources Board 2004

FIGURE 3.3-1
Air Basins in Covered Lands

"good" ozone layer extends upward from approximately 10 to 30 miles above the earth's surface and protects life on earth from the sun's harmful ultraviolet rays.

Unlike other pollutants, ozone is not emitted directly into the air by specific sources. Rather, ozone is a photochemical pollutant created by sunlight acting on other air pollutants known as precursors, specifically reactive organic gases (ROG) and oxides of nitrogen (NO_X). In order to reduce ozone concentrations, it is necessary to control the emissions of these ozone precursors. Significant ozone formation generally requires an adequate amount of precursors in the atmosphere and several hours in a stable atmosphere with strong sunlight. ROGs and NO_X are emitted from various sources throughout Kern County.

Ozone is a regional air pollutant. It is generated over a large area and is transported and spread by wind. Ozone, the primary constituent of smog, is the most complex, difficult to control, and pervasive of the criteria pollutants. Sources of ozone precursor gases number in the thousands. Common sources include consumer products, gasoline vapors, chemical solvents, and combustion products of various fuels. The ozone-forming chemical reactions originating from gas stations, motor vehicles, large industrial facilities, and small businesses such as bakeries and dry cleaners, often take place in another location from the source of the precursors, catalyzed by sunlight and heat. High ozone concentrations can form over large regions when emissions from motor vehicles and stationary sources are carried hundreds of miles from their origins. While the ozone in the upper atmosphere absorbs harmful ultraviolet light, ground-level ozone is damaging to the tissues of plants, animals, and humans, as well as a wide variety of inanimate materials such as plastics, metals, fabrics, rubber, and paints. Societal costs from ozone damage include increased medical costs, the loss of human and animal life, accelerated replacement of industrial equipment, and reduced crop yields.

High concentrations of ground-level ozone can adversely affect the human respiratory system, causing inflammation and irritation, and can induce symptoms such as coughing, chest tightness, shortness of breath, and worsening of asthma symptoms. Many respiratory ailments, as well as cardiovascular disease, are aggravated by exposure to high ozone levels. Ozone in sufficient doses increases the permeability of lung cells, rendering them more susceptible to toxins and microorganisms. High levels of ozone may negatively affect immune systems, making people more susceptible to respiratory illnesses including bronchitis and pneumonia. Ozone also accelerates aging and exacerbates preexisting asthma and bronchitis and, in cases of high concentrations, can lead to the development of asthma in active children. Active people, both children and adults, appear to be more at risk from ozone exposure than those with a low level of activity. Additionally, the elderly and those with respiratory disease are also considered sensitive populations for ozone.

Reactive Organic Gases and Volatile Organic Compounds

Hydrocarbons are organic gases that are formed of hydrogen and carbon. There are several subsets of organic gases, including volatile organic compounds (VOCs) and ROGs. Hydrocarbons are organic gases that are formed solely of hydrogen and carbon. ROGs include all hydrocarbons except those exempted by CARB. Therefore, ROGs are a set of organic gases based on state rules and regulations. VOCs are similar to ROGs in that they include all organic gases except those exempted by Federal law.

The primary health effects of hydrocarbons result from the formation of ozone. High levels of hydrocarbons in the atmosphere can interfere with oxygen intake by reducing the amount of available oxygen through displacement. There are no separate Federal or California ambient air quality standards for ROGs. Carcinogenic forms of ROGs are considered toxic air contaminants (TACs). An example is the carcinogen benzene. The health effects of individual ROGs are described below.

Oxides of Nitrogen

NO_X are a family of highly reactive gases that are a primary precursor to the formation of ground-level ozone and that react in the atmosphere to form acid rain. NO_X are ozone precursors that react with ROGs to form ozone (see above). NO_X are emitted from the use of solvents and combustion processes in which fuel is burned at high temperatures, principally from motor vehicle exhaust and stationary sources, such as electric utilities and industrial boilers. Nitrogen dioxide (NO_2) is a strong oxidizing agent that reacts in the air to form corrosive nitric acid as well as toxic organic nitrates.

Direct inhalation of NO_2 can also cause a wide range of health effects. NO_2 can irritate the lungs, cause lung damage, and lower resistance to respiratory infections such as influenza. Short-term exposures (i.e., less than 3 hours) to low levels of NO_2 may lead to changes in airway responsiveness and lung function in individuals with preexisting respiratory illnesses. These exposures may also increase respiratory illnesses in children. Long-term exposures to NO_2 may lead to increased susceptibility to respiratory infection and may cause irreversible alterations in lung structure. Other health effects associated with NO_2 are an increase in the incidence of chronic bronchitis and lung irritation. Chronic exposure to NO_2 may lead to eye and mucus membrane aggravation, along with pulmonary dysfunction. NO_X can cause fading of textile dyes and additives, deterioration of cotton and nylon, and corrosion of metals due to production of particulate nitrates. Airborne NO_X can also impair visibility. NO_2 is a major component of acid deposition in California. NO_X may affect both terrestrial and aquatic ecosystems. NO_2 in the air is a potentially significant contributor to a number of environmental effects such as acid rain and eutrophication in coastal waters. Eutrophication occurs when a body of water suffers an increase in nutrients that reduces the amount of oxygen in the water, resulting in excessive algae growth that produces an environment that is destructive to fish and other animal life.

Carbon Monoxide

Carbon monoxide (CO) is emitted by mobile and stationary sources as a result of incomplete combustion of hydrocarbons or other carbon-based fuels. CO is an odorless, colorless, poisonous gas that is highly reactive. CO is a byproduct of motor vehicle exhaust, which contributes more than two-thirds of all CO emissions nationwide. In cities, automobile exhaust can cause as much as 95% of all CO emissions. These emissions can result in high concentrations of CO, particularly in local areas with heavy traffic congestion. Other sources of CO emissions include industrial processes and fuel combustion in sources such as boilers and incinerators. Despite an overall downward trend in concentrations and emissions of CO, some metropolitan areas still experience high levels of the gas.

CO enters the bloodstream and binds more readily to hemoglobin, the oxygen-carrying protein in blood, which reduces the capacity of blood to carry oxygen and thus reduces oxygen delivery to organs and tissues. The health threat from CO is most serious for those who suffer from cardiovascular disease. Healthy individuals are also affected but only at higher levels of exposure. Exposure to CO near the levels of the ambient air quality standards can lead to fatigue, headaches, confusion, and dizziness. CO exposure has been associated with aggravation of angina pectoris and other aspects of coronary heart disease, decreased exercise tolerance in people with peripheral vascular disease and lung disease, impairment of central nervous system functions, and possible increased health risks to fetuses. At high altitudes, these effects are worsened.

Sulfur Dioxide

Sulfur dioxide (SO_2) is a colorless, irritating gas with a "rotten egg" smell formed primarily by the combustion of sulfur-containing fossil fuels. In the late 1970s in the SJVAB portion of Kern County, SO_2 was a pollutant of concern. With the successful application of regulations, the levels have been reduced significantly.

Effects from SO_2 exposures at levels near the 1-hour standard include bronchoconstriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness, especially during exercise or physical activity. Children, the elderly, and people with asthma, cardiovascular disease, or chronic lung disease, such as bronchitis or emphysema, are most susceptible to these symptoms. Continued exposure at elevated levels of SO_2 results in increased incidence of pulmonary symptoms and disease, decreased pulmonary function, and increased risk of mortality. SO_2 also is a major precursor to $PM_{2.5}$, which is a significant health concern and is a main contributor to poor visibility.

Particulate Matter

Particulate matter pollution consists of very small liquid and solid particles floating in the air. Some particles are large or dark enough to be seen, such as soot or smoke. Others are so small they can be detected only with an electron microscope. Particulate matter is a mixture of materials that can include smoke, soot, dust, salt, acids, and metals. Particulate matter also forms when gases emitted from motor vehicles and industrial sources undergo chemical reactions in the atmosphere. PM_{10} refers to particles less than or equal to 10 microns in diameter. $PM_{2.5}$ refers to particles less than or equal to 2.5 microns in diameter and are a subset of PM_{10}.

In the western United States, there are sources of PM_{10} in both urban and rural areas. PM_{10} and $PM_{2.5}$ are emitted from stationary and mobile sources, including diesel trucks and other motor vehicles, power plants, industrial processing, wood-burning stoves and fireplaces, wildfires, dust from roads, construction, landfills, agriculture, and fugitive windblown dust. Because particles originate from a variety of sources, their chemical and physical compositions vary widely.

PM_{10} and $PM_{2.5}$ particles are small enough (about one-seventh the thickness of a human hair, or smaller) to be inhaled into and lodged in the deepest portion of the lung, evading the respiratory system's natural defenses. Health problems begin as the body reacts to these foreign particles. Acute and chronic health effects associated with high particulate levels include the aggravation of chronic respiratory disease, heart and lung disease, coughing, bronchitis, and respiratory illnesses in children. Particulates can also increase the number and severity of asthma attacks and reduce the body's ability to fight infection. Recent mortality studies have shown a statistically significant direct association between mortality and daily concentrations of particulate matter in the air. Non-health-related effects include reduced visibility and soiling of buildings.

Lead

Lead is a metal that is a natural constituent of air, water, and the biosphere (the portion of the earth and its atmosphere that can support life). Lead is neither created nor destroyed in the environment, so it essentially persists forever. Lead was used until recently to increase the octane rating in auto fuel; gasoline-powered automobile engines were a major source of airborne lead with the use of leaded fuels. Because the use of leaded fuel has been mostly phased out, the ambient concentrations of lead have dropped dramatically. The San Joaquin Valley Air Pollution Control District (SJVAPCD) no longer monitors lead in the ambient air of the SJVAB.

Because lead is only slowly excreted, exposures to small amounts of lead from a variety of sources can accumulate to harmful levels. Effects from inhalation of lead near the level of the ambient air quality standard include impaired blood formation and nerve conduction in humans. Lead can adversely affect the nervous, reproductive, digestive, immune, and blood-forming systems. Symptoms can include fatigue, anxiety, short-term memory loss, depression, weakness in the extremities, and learning disabilities in children. Lead is also thought to cause cancer.

Sulfates

Sulfates are particulate products of the combustion of sulfur-containing fossil fuels. When sulfur monoxide (SO) or SO_2 is exposed to oxygen, it precipitates out into sulfates (SO_3^{2-} or SO_4^{2-}). Data collected in Kern County identify levels of sulfates that are significantly less than the applicable health standards.

Sulfates are the fully oxidized ionic form of sulfur. Sulfates occur in combination with metal and/or hydrogen ions. In California, emissions of sulfur compounds occur primarily from the combustion of petroleum-derived fuels that contain sulfur (e.g., gasoline and diesel fuel). Sulfur in fuels is oxidized to SO_2 during the combustion process and subsequently converted to sulfate compounds in the atmosphere. The conversion of SO_2 to sulfates takes place comparatively rapidly and completely in urban areas of California due to regional meteorological features.

CARB's sulfates standard is designed to prevent aggravation of respiratory symptoms. Effects of sulfate exposure at levels above the standard include a decrease in ventilatory function, aggravation of asthmatic symptoms, and an increased risk of cardiopulmonary disease. Sulfates are particularly effective in degrading visibility, and because they are usually acidic, they can harm ecosystems and damage materials and property.

Hydrogen Sulfide

Hydrogen sulfide (H_2S) is a colorless gas with the odor of rotten eggs. It is formed during bacterial decomposition of sulfur-containing organic substances. In addition, it can be present in sewer gas and some natural gas, and it can be emitted as the result of geothermal energy exploitation.

Extremely high levels of H_2S can be harmful, even deadly. Fortunately, H_2S can be detected by the human nose at an extremely low level, a concentration that is about 0.0025 times lower than the threshold for harmful effects to human health. Most of the injuries related to H_2S occur in occupational settings where the potential to be exposed to sudden bursts of H_2S are much greater than the residential setting. In 1984, a CARB committee concluded that the state standard for H_2S is adequate to protect public health and significantly reduce odor annoyance. Breathing H_2S at levels above the California standard will result in exposure to a very disagreeable odor.

Vinyl Chloride

Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Vinyl chloride is mostly used to make polyvinyl chloride (PVC) plastic and vinyl products. Vinyl chloride has been detected near landfills, sewage plants, and hazardous waste sites due to microbial breakdown of chlorinated solvents.

Short-term exposure to vinyl chloride has been linked with central nervous system effects, eye irritations, respiratory tract irritations, and inhibition of blood clotting. Long-term exposure has been linked with liver damage, changes to bones at the ends of fingers, joint and muscle pain, changes in the skin, and central nervous system effects. Several case studies have reported changes in reproductive health and child-development health during pregnancy related to vinyl chloride exposure.

Visibility-Reducing Particulates

Visibility-reducing particles consist of suspended particulate matter, which is a complex mixture of tiny particles that consists of dry solid fragments, solid cores with liquid coatings, and small droplets of liquid. These particles vary greatly in shape, size, and chemical composition, and can be made up of many different materials, such as metals, soot, soil, dust, and salt. The statewide standard is intended to limit the frequency and severity of visibility impairment due to regional haze.

Hazardous Air Pollutants and Toxic Air Contaminants

Hazardous air pollutants (HAP) is a term used by the Federal Clean Air Act that includes a variety of pollutants generated or emitted by industrial production activities. Additionally, TACs are regulated by the CARB and local air districts. Ten TACs have been identified through ambient air quality data as posing the most substantial health risks in California. Emissions of TACs have the potential to cause various health effects, including cancer; as well as irritation of or damage to eyes, skin and the respiratory tract; drowsiness, dizziness and other neurological symptoms; blood disorders and cardiovascular diseases; and damage to liver or kidneys; weakness, lethargy, nausea, vomiting, or memory loss.

Based on CARB emission inventory data, the following were the TAC emissions that occurred in Kern County during 2005:

- Acetaldehyde (305 tons per year)
- Benzene (829 tons per year)
- 1,3-butadiene (91 tons per year)
- Carbon tetrachloride (0.02 ton per year)
- Hexavalent chromium (0.29 ton per year)
- Para-dichlorobenzene (54 tons per year)
- Formaldehyde (1,525 tons per year)
- Methylene chloride (84 tons per year)
- Perchloroethylene (110 tons per year)
- Diesel particulate matter (871 tons per year)

Coccidioides immitis (Valley Fever)

The *Coccidioides immitis* fungal spores are often found in the soil around rodent burrows, Indian ruins, and burial grounds. The spores become airborne when the soil is disturbed by winds, construction, farming, or other activities. This type of fungus is common in the southwestern United States and even more endemic in Kern County. The ecologic factors that appear to be most conducive to the survival and replication of the fungal spores are high summer temperatures, mild winters, sparse rainfall, and alkaline, sandy soils. Inhalation of *Coccidioides immitis* can cause Coccidioidomycosis, more commonly known as "Valley Fever." Valley Fever symptoms generally occur within 2 to 3 weeks of exposure. Approximately 60% of Valley Fever cases are mild and display flu-like symptoms or no symptoms at all. Of those who are exposed and seek medical treatment, the most common symptoms are fatigue, cough, chest pain, fever, rash, headache, and joint aches. In some case, painful red bumps may develop. It should be noted that these symptoms are not unique to Valley Fever and may be caused by other illnesses as well.

3.3.2 Regulatory Setting

Air quality in California is regulated by several agencies, including the U.S. Environmental Protection Agency (EPA), CARB, and local air districts such as SJVAPCD, Eastern Kern Air Pollution Control District[2] (EKAPCD), and South Coast Air Quality Management District (SCAQMD), as described in this section.

Each of these agencies develops rules and/or regulations to attain compliance with applicable Federal and state air quality goals and other statutory requirements. Generally, EPA regulations establish minimum requirements, and state and local regulations may be more stringent. In California, mobile sources of air pollutants (e.g., cars and trucks) are largely controlled through EPA and CARB, while most stationary sources are regulated by local air districts (i.e., SJVAPCD and EKAPCD). The Covered Lands are subject to air quality regulations developed and implemented at the Federal, state, and local levels. Plans, policies, and regulations that are relevant to the alternatives evaluated in this Supplemental Draft EIS are discussed below.

3.3.2.1 Federal Laws, Regulations, and Standards

Federal Clean Air Act

The Federal Clean Air Act establishes national ambient air quality standards (NAAQS) for six criteria pollutants: ozone, CO, NO_2, SO_2, PM_{10}, $PM_{2.5}$, and lead. Some portions of the Federal Clean Air Act (e.g., certain mobile source requirements) are implemented directly by EPA, while other portions of the act (e.g., stationary source requirements) are delegated by EPA to state and local agencies. In addition to establishing air quality standards, the Federal Clean Air Act specifies dates for achieving compliance with these standards and regulates various categories of HAPs. Applicable air quality standards are presented in Table 3.3-1.

Areas that do not meet the standards shown in Table 3.3-1 are classified as nonattainment areas. Air quality standard attainment for the study area is shown in Table 3.3-2. The determination for attainment is based on air quality monitoring data collected and maintained by the air districts. Some areas are unclassified, which means no monitoring data are available. Unclassified areas are typically treated as being in attainment. Because the attainment/nonattainment designation is pollutant specific, an area may be classified as nonattainment for one pollutant and attainment for another. Similarly, because the state and Federal standards differ, an area could be classified as attainment for the Federal standard and as nonattainment for the state standard for the same pollutant. The attainment status for each air basin is discussed in Section 3.3.3, Ambient Air Monitoring Data.

The Federal Clean Air Act also mandates that states submit and implement a state implementation plan (SIP) for local nonattainment areas. These plans must include pollution control measures that demonstrate how the standards will be met. In 1990, amendments to the Federal Clean Air Act identified specific emission-reduction goals for basins not meeting the NAAQS. These amendments require both a demonstration of reasonable progress toward attainment of emission-reduction goals and incorporation of additional sanctions for failure to attain or to meet interim milestones.

[2] Formerly the Kern County Air Pollution Control District.

Table 3.3-1. State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	Federal Standard	California Standard
Ozone (O_3)	8 Hour	0.075 part per million (147 micrograms/cubic meter) (2008-Present)	0.070 part per million (137 micrograms/cubic meter) (2006-Present)
	1 Hour	—	0.09 part per million (180 micrograms/cubic meter)
Carbon monoxide (CO)	8 Hour	9 parts per million (10 milligrams/cubic meter)	9.0 parts per million (10 milligrams/cubic meter)
	1 Hour	35 parts per million (40 milligrams/cubic meter)	20 parts per million (23 milligrams/cubic meter)
Nitrogen dioxide (NO_2)	Annual Average	0.053 part per million (100 micrograms/cubic meter)	0.030 part per million (56 micrograms/cubic meter)
	1 Hour	0.100 part per million (188 micrograms/cubic meter)	0.18 part per million (338 micrograms/cubic meter)
Sulfur dioxide (SO_2)	24 Hour	—	0.04 part per million (105 micrograms/cubic meter)
	3 Hour	0.5 part per million (1,300 micrograms/cubic meter)	—
	1 Hour	—	0.25 parts per million (655 micrograms/cubic meter)
Respirable particulate matter (PM_{10})	Annual Arithmetic Mean	—	20 micrograms/cubic meter
	24 Hour	150 micrograms/cubic meter	50 micrograms/cubic meter
Fine particulate matter ($PM_{2.5}$)	Annual Arithmetic Mean	15.0 micrograms/cubic meter	12 micrograms/cubic meter
	24 Hour	35 micrograms/cubic meter	—
Sulfates (SO_4)	24 Hour	—	25 micrograms/cubic meter
Lead (Pb)	30 Day Average	—	1.5 micrograms/cubic meter
	Calendar Quarter	1.5 micrograms/cubic meter	—
Hydrogen sulfide (H_2S)	1 Hour	—	0.03 part per million (42 micrograms/cubic meter)
Vinyl chloride (chloroethene)	24 Hour	—	0.010 part per million (26 micrograms/cubic meter)
Visibility-reducing particulates	1 Observation (8 hour)	—	Insufficient amount to produce an extinction coefficient of 0.23 per kilometer due to particles when the relative humidity is less than 70%.

Source: California Air Resources Board 2010a

Table 3.3-2. Basin Air Quality Attainment Status

Pollutant	San Joaquin Valley Air Basin (Kern County Portion)		Mojave Desert Air Basin (Kern County Portion)		South Coast Air Basin (Los Angeles County Portion)	
	Federal Standard	State Standard	Federal Standard	State Standard	Federal Standard	State Standard
Ozone (O_3) (1-hour standard)	No Federal standard[1]	Nonattainment	No Federal standard[1]	Nonattainment	No Federal standard[1]	Nonattainment
Ozone (O_3) (8-hour standard)	Nonattainment: extreme		Subpart 1, nonattainment		Nonattainment: extreme	
Respirable particulate matter (PM_{10})	Attainment (maintenance)	Nonattainment	Nonattainment: serious	Nonattainment	Nonattainment: serious	Nonattainment
Fine particulate matter ($PM_{2.5}$)	Nonattainment	Nonattainment	Unclassifiable/ attainment	Unclassified	Nonattainment	Nonattainment
Carbon monoxide (CO)	Unclassifiable/ attainment	Attainment	Unclassifiable/ attainment	Unclassified	Attainment	Attainment
Nitrogen dioxide (NO_2)	Unclassifiable/ attainment	Attainment	Unclassifiable/ attainment	Attainment	Attainment (maintenance)	Nonattainment
Sulfur dioxide (SO_2)	Attainment	Attainment	Unclassifiable	Attainment	Attainment	Attainment
Lead (Pb)	Attainment	Attainment	Attainment	Attainment	Attainment	Nonattainment
Hydrogen sulfide (H_2S)	No Federal standard	Unclassified	No Federal standard	Unclassified	No Federal standard	Unclassified
Sulfates (SO_4)	No Federal standard	Attainment	No Federal standard	Attainment	No Federal standard	Attainment
Visibility-reducing particles	No Federal standard	Unclassified	No Federal standard	Unclassified	No Federal standard	Unclassified

Source: 17 CCR 60201–60210 (state standards); 40 CFR 81.305 (Federal standards)

[1] On December 30, 2011, EPA issued a final rule determining that the SJVAB, MDAB and SCAB failed to attain the now-revoked 1-hour ozone NAAQS. 76 Fed.Reg. 82133. This determination has consequences with respect to the anti-backsliding provisions of the Federal Clean Air Act. 76 *Federal Register* . 82146; *see also* 40 CFR 52.282(d).

General Conformity Requirements

The EPA requires that Federal actions conform to the appropriate SIP for attaining clean air (*general conformity*) when the total direct and indirect emissions that will result from the Federal action would exceed certain de minimis thresholds. *Direct emissions* are "emissions of a criteria pollutant or its precursors that are caused or initiated by the Federal action and originate in a nonattainment or maintenance area and occur at the same time and place as the action and are reasonably foreseeable" (40 Code of Federal Regulations [CFR] 93.152). *Indirect emissions* are defined as "emissions of a criteria pollutant or its precursors (1) that are caused or initiated by the Federal action and originate in the same nonattainment or maintenance area but occur at a different time or place as the action; (2) that are reasonably foreseeable; (3) that the agency can practically control; and (4) for which the agency has continuing program responsibility." *Id.*

The conformity regulations further state that: "For purposes of this definition [of indirect emissions], even if a Federal licensing, rulemaking or other approving action is a required initial step for a subsequent activity that causes emissions, such initial steps do not mean that a Federal agency can practically control any resulting emissions." *Id.*

Conformity only applies to nonattainment and maintenance areas. In such areas, conformity requirements only apply to the pollutants for which the areas were designated nonattainment or maintenance.

The Federal action addressed in this EIS is issuance of an incidental take permit (ITP) in accordance with Section 10(a)(1)(B) of the Federal Endangered Species Act (ESA). This Federal action would not directly result in emissions of criteria pollutants. Nor would the Federal action result in indirect emissions because the Service does not exercise continuing control over any development activities that would result in emissions of criteria pollutants after issuance of the ITP. As the regulatory definition of indirect emissions states, a Federal approval that is a necessary first step for a later activity that will result in emissions does not mean that the Federal agency can practically control any of these emissions. In this case, the Federal action is a necessary first step to any development activity that will ultimately occur on the Covered Lands. However, the Service does not practically control any of this development activity[3]. Thus, a conformity determination is not required for this Federal action.

3.3.2.2 State Laws, Regulations, and Standards

California Clean Air Act of 1988

The California Clean Air Act of 1988, amended in 1992, requires all air districts in the state to endeavor to achieve and maintain state ambient air quality standards for criteria pollutants by the earliest practicable date. CARB is the state agency responsible for the coordination and administration of both state and Federal air pollution control programs in California. CARB sets the CAAQS and coordinates and guides regional and local air quality planning efforts required by the California Clean Air Act and to prepare and submit the SIP to the EPA. State and Federal standards are presented in Table 3.3-1 and attainment status for the study area is presented in Table 3.3-2.

[3] That a conformity analysis is not required is also supported by EPA's guidance document, *General Conformity Guidance: Questions and Answers*, which states: "Direct and indirect emissions must be reasonably foreseeable and the Federal agency must be able to practically control them as part of its *continuing* program responsibility." Question 6 (emphasis added) (U.S. Environmental Protection Agency 1994).

CARB also undertakes research, compiles emission inventories, develops suggested control measures, and provides oversight of local programs. CARB also establishes emission standards for motor vehicles. The Federal Clean Air Act allows California to adopt more stringent vehicle emission standards than the rest of the nation due to the state's severe ozone nonattainment status. CARB has also set standards for sulfates, hydrogen sulfide, vinyl chloride, and visibility-reducing particles.

The California Clean Air Act directs CARB to assess the contribution of ozone and ozone precursors in upwind basins or regions on ozone concentrations that violate the state ozone standard in downwind basins or regions. The movement of ozone and ozone precursors between basins or regions is referred to as "transport." In addition, the California Clean Air Act directs CARB to establish mitigation requirements for upwind districts commensurate with their contributions to the air quality problems in downwind basins or regions. The most recent requirements were established in 2003 in Title 17, California Code of Regulations (CCR), Sections 70600 and 70601. These regulations require that upwind regions include sufficient emission control measures in their ozone attainment plans to mitigate the effects of pollution sources in their jurisdictions on ozone concentrations in downwind areas commensurate with the level of contribution. Specifically, both the SJVAB and the SCAB must:

- require the adoption and implementation of all feasible measures as expeditiously as practicable,
- require the adoption and implementation of best available retrofit control technology on all existing stationary sources of ozone precursor emissions as expeditiously as practicable, and
- include measures sufficient to attain the state ambient air quality standard for ozone by the earliest practicable date in specified downwind air basins, including the MDAB, for violations caused by transport from the SJVAB or the SCAB.

Legislation Relevant to Toxic Air Contaminants

California's air toxics control program began in 1983 with the passage of the Toxic Air Contaminant Identification and Control Act, better known as Assembly Bill (AB) 1807 or the Tanner Bill. The Tanner Bill established a regulatory process for the scientific and public review of individual toxic compounds. When a compound becomes listed as a TAC under the Tanner process, CARB normally establishes minimum statewide emission control measures to be adopted and enforced by CARB or the local air pollution control districts. By 1992, 18 of the 189 Federal HAPs had been listed by CARB as state TACs. Later legislative amendments (AB 2728) required CARB to incorporate all 189 Federal HAPs into the state list of TACs.

The second major component of California's air toxics program that supplements the Tanner process was provided by the passage of AB 2588, the Air Toxics "Hot Spots" Information and Assessment Act of 1987. AB 2588 currently requires evaluation of over 600 air compounds, including all of the Tanner-designated TACs. Under AB 2588, specified facilities must quantify emissions of regulated air toxics and report them to the local air district. If the air district determines that a potentially significant public health risk is posed by a given facility, the facility is required to perform a health risk assessment and may be required to notify the public in the affected area if the calculated risks exceed specified criteria.

On August 27, 1998, CARB formally identified particulate matter emitted by diesel-fueled engines, or diesel particulate matter as a TAC. Diesel engines emit TACs in both gaseous and particulate forms. The particles emitted by diesel engines include toxic compounds, many of which have been identified as HAPs by EPA and as TACs by CARB. Since by weight, the vast majority of diesel exhaust particles are very small (94% of their combined mass consists of particles less than 2.5 microns in diameter), both the particles and the associated TACs are inhaled into the lungs. While the gaseous portion of diesel exhaust also contains TACs, CARB's August 1998 action was specific to diesel particulate emissions, which, according to supporting CARB studies, represent 50 to 90% of the mutagenicity (ability to cause mutations) of diesel exhaust.

Under AB 1807, this designation prompted CARB to adopt measures to reduce diesel particulate matter emissions. In September 2000, CARB approved the Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel Risk Reduction Plan, California Air Resources Board 2000). The Diesel Risk Reduction Plan outlines a comprehensive and ambitious program that includes the development of numerous new control measures over the next several years aimed at substantially reducing emissions from new and existing on-road vehicles (e.g., heavy-duty trucks and buses), off-road equipment (e.g., graders, tractors, forklifts, sweepers, and boats), portable equipment (e.g., pumps), and stationary engines (e.g., stand-by power generators). TACs do not have ambient air quality standards. Instead, TAC effects are evaluated by calculating the health risks associated with a given exposure.

3.3.2.3 Local Laws, Regulations, and Standards

Air quality is regulated in the study area at the local level by SJVAPCD (SJVAB), EKAPCD (MDAB), and SCAQMD (SCAB). Each of these districts has adopted attainment plans to achieve state and Federal air quality standards to comply with regulatory requirements. Applicable plans and policies are discussed below.

San Joaquin Valley Air Pollution Control District

The SJVAPCD has adopted attainment plans to achieve state and Federal air quality standards to comply with regulatory requirements. SJVAPCD must monitor its progress in implementing attainment plans and must periodically report to CARB and EPA. SJVAPCD's primary means of implementing air quality plans and policies is through adoption and enforcement of rules and regulations. During the local approval process for individual projects, the SJVAPCD considers whether a proposed project is consistent with applicable attainment plans and rules and regulations. The most recently adopted plans and rules applicable to potential development within the study area are listed below.

In addition to SJVAPCD rules, and based in part on its extreme nonattainment status for the Federal 8-hour ozone standards, the SJVAPCD continues to employ three strategies for reducing emissions generated by indirect sources as identified in the 1991 air quality attainment plan. These strategies include enhanced use of the California Environmental Quality Act (CEQA) to encourage project-specific air quality mitigation measures, the encouragement of all cities and counties in the SJVAB to adopt an air quality element or air quality policies as part of their general plans, and implementation of an "indirect source" review and mitigation program.

Attainment Plans

- **Extreme 1-Hour Ozone Attainment Demonstration Plan.** This plan sets forth measures and emission reduction strategies designed to attain the Federal 1-hour ozone standard by November 15, 2010, and an emissions inventory, outreach, and Rate of Progress demonstration. (San Joaquin Valley Air Pollution Control District 2004).
- **2007 8-Hour Ozone Plan**. This plan sets forth measures and a "dual path" strategy to attain the Federal 8-hour ozone standard for the SJVAB by reducing emissions on ozone and particulate matter precursors. The plan also includes provisions for improved pollution control technologies for mobile and stationary sources, as well as an increase in state and Federal funding for incentive-based measures to reduce emissions. All local measures would be adopted by SJVAPCD before 2012 (San Joaquin Valley Air Pollution Control District 2007a). This plan was approved by EPA on December 15, 2011.

- **2007 PM_{10} Maintenance Plan**. On October 25, 2007, CARB approved SJVAPCD's 2007 PM_{10} Maintenance Plan and Request for Redesignation with modifications to the transportation conformity budgets. On September 25, 2008, the EPA redesignated the SJVAB to attainment for the PM_{10} NAAQS and approved the PM_{10} maintenance plan.
- **2008 $PM_{2.5}$ Plan.** The SJVAPCD Governing Board adopted the 2008 $PM_{2.5}$ plan on April 30, 2008. This plan is designed to assist the San Joaquin Valley Air Basin in attaining all $PM_{2.5}$ standards including the 1997 Federal standards, the 2006 Federal standards, and the state standard as soon as possible**.** On July 13, 2011, EPA issued a proposed rule partially approving the 2008 $PM_{2.5}$ plan. Subsequently, on November 9, 2011, EPA issued a final rule approving most of the plan with an effective date of January 9, 2012. However, the EPA disapproved the plan's contingency measures because they would not provide sufficient emission reductions.

SB 656 Particulate Matter Control Measure Implementation Schedule

SB 656 was enacted in 2003 and codified as Health and Safety Code Section 39614. SB 656 seeks to reduce exposure to PM_{10} and $PM_{2.5}$ and to make further progress toward attainment of the NAAQS and CAAQS for PM_{10} and $PM_{2.5}$. SB 656 required CARB, in consultation with local air districts, to develop and adopt lists of "the most readily available, feasible, and cost-effective" particulate matter control measures. Subsequently, the air districts were required to adopt implementation schedules for the relevant control measures in their district. In June 2005, SJVAPCD adopted its SB 656 Particulate Matter Control Measure Implementation Schedule (San Joaquin Valley Air Pollution Control District 2005). The SJVAPCD analysis of the CARB list concluded that all but one of the measures that apply to SJVAPCD sources had been implemented or were in one of SJVAPCD's attainment plans for adoption within the next 2 years. The remaining measure was related to a future amendment of a rule for gasoline transfer into stationary storage containers, delivery vessels, and bulk plants.

Rules

- **Rule 2201 (New and Modified Stationary Source Review)** requires review of new and modified stationary sources of air pollution and prohibits increases of emissions above specified thresholds from new and modified stationary sources of all nonattainment pollutants and their precursors.
- **Rule 4601 (Architectural Coatings)** limits VOC emissions from architectural coatings. This rule specifies architectural coating storage, cleanup, and labeling requirements.
- **Rule 4641 (Cutback, Slow Cure, and Emulsified Asphalt, Paving, and Maintenance Operations)** limits VOC emissions by restricting the application and manufacturing of cutback asphalt, slow cure asphalt, and emulsified asphalt for paving and maintenance operations.
- **Rule 4661 (Organic Solvents)** limits the emissions of VOCs from the use of organic solvents, and specifies reduction, monitoring, reporting, and disposal requirements.
- **Rule 4663 (Organic Solvent Cleaning, Storage, and Disposal)** includes restrictions on the types of solvents that may be used and restrictions on the organic content of solvents used for cleaning.
- **Rule 4901 (Wood Burning Fireplaces and Wood Burning Heaters)** limits emissions of CO and PM from wood-burning fireplaces and wood-burning heaters, and establishes a public education program to reduce wood burning emissions. The rule restricts sales and transfers of wood-burning heaters, limits wood-burning fireplaces or heaters in new residential developments, and prohibits certain fuel types.

- **Rule 4902 (Residential Water Heaters)** limits NO_X emissions from residential water heaters, restricts natural-gas-fired water heaters emissions, and requires certification and identification of water heaters.
- **Rule 8011 (General Requirements)** reduces ambient concentrations of PM_{10} by requiring actions to prevent, reduce, or mitigate anthropogenic fugitive dust emissions. Rule 8011 prohibits use of certain materials as soil stabilizers or dust suppressants.
- **Rule 8021 (Construction, Demolition, Excavation, Extraction and Other Earthmoving Activities)** requires fugitive dust emissions throughout construction activities (from preactivity to active operations and during periods of inactivity) to comply with the conditions of a stabilized unpaved road surface and to not exceed an opacity limit of 20%, by means of water application, chemical dust suppressants, or constructing and maintaining wind barriers. A dust control plan is also required and must be submitted to the air pollution control officer at least 30 days prior to the start of any construction activities on any residential development site that include 10 acres or more of disturbed surface area, or will include moving more than 2,500 cubic yards per day of bulk materials on at least 3 days.
- **Rule 8031 (Bulk Materials)** limits fugitive dust emissions from the outdoor handling, storage, and transport of bulk materials by prohibiting activities unless appropriate control measures are implemented to limit visible dust emissions to 20% opacity or to comply with the conditions for a stabilized surface as defined in Rule 8011 (General Requirements).
- **Rule 8041 (Carryout and Trackout)** limits carryout and trackout during construction, demolition, excavation, extraction, and other earthmoving activities (Rule 8021), from bulk materials handling (Rule 8031), from paved and unpaved roads (Rule 8061), and from unpaved vehicle and equipment traffic areas (Rule 8071) where carryout has occurred or may occur.
- **Rule 8051 (Open Areas)** requires fugitive dust emissions from any open area having 3.0 acres or more of disturbed surface area that has remained undeveloped, unoccupied, unused, or vacant for more than 7 days to comply with the conditions of a stabilized unpaved road surface and to not exceed an opacity limit of 20%, by means of water application, chemical dust suppressants, paving, applying and maintaining gravel, or planting vegetation.
- **Rule 8061 (Paved and Unpaved Roads)** specifies the width of paved shoulders on paved roads and guidelines for medians. The rule requires gravel, roadmix, paving, landscaping, watering, and/or the use of chemical dust suppressants on unpaved roadways to prevent exceeding an opacity limit of 20%. Exemptions to this rule include “any unpaved road segment with less than 26 annual average daily trips.”
- **Rule 8071 (Unpaved Vehicle/Equipment Traffic Areas)** limits fugitive dust from unpaved vehicle and equipment traffic areas by using gravel, roadmix, paving, landscaping, watering, and/or the use of chemical dust suppressants to prevent exceeding an opacity limit of 20%. Exemptions to this rule include “unpaved vehicle and equipment traffic areas with less than 50 annual average daily trips.”
- **Rule 9510 (Indirect Source Review)** is intended to reduce emissions of NO_X and PM_{10} from new development projects. The rule applies to development projects that seek to gain a discretionary approval for projects that, upon full buildout, would include any one of the following: 50 residential units; 2,000 square feet of commercial spaces; 25,000 square feet of industrial space; 100,000 square feet of heavy industrial space; 20,000 square feet of medical office space; 39,000 square feet of general office space; 9,000 square feet of educational space; 10,000 square feet of government space; 20,000 square feet of recreational space; or 9,000 square feet of uncategorized space. Under Rule 9510, new development projects are required to mitigate a portion of their emissions by mitigating on-site emissions or contributing to a mitigation fund that would be used to pay for the most cost-effective projects to reduce

emissions. Specifically, development projects are required to reduce 20% of NO_X and 45% of PM_{10} emissions from construction equipment relative to the statewide average and reduce 33.3% of NO_X and 50% of PM_{10} operational baseline emissions over a 10-year period. Examples of such projects include retirement and crushing of gross-polluting cars, replacement of older diesel engines and diesel-powered vehicles, and programs that would encourage the replacement of gas-powered lawn mowers with electric lawn mowers.

Eastern Kern Air Pollution Control District

Attainment Plans

Similar to the plans developed by the SJVAPCD for the SJVAB, the EKAPCD has adopted attainment plans to achieve state and Federal air quality standards to comply with regulatory requirements within the MDAB. The most recently adopted plans applicable to the study are described below.

- **2002 Ozone Attainment Demonstration, Maintenance Plan, and Redesignation Request** – Ozone data collected from 1999 through 2002 at Eastern Kern County's three ozone monitoring stations indicated attainment of the NAAQS has been achieved, and therefore the EKAPCD requested redesignation of the ozone attainment status. The 2002 plan further demonstrates:
  - how improvements to ozone levels in Eastern Kern County are due to implementation of ozone control strategies contained in the region's SIP,
  - the significant ozone precursor (VOC and NO_X) emission reductions generated in the region are permanent and enforceable, and
  - how the maintenance plan will ensure the region will not experience any exceedances through the year 2015 (Eastern Kern Air Pollution District 2003).

As described above, CARB, in consultation with local air districts, developed a list of "the most readily available, feasible, and cost-effective" PM control measures. In September 2007, the EKAPCD adopted its "SB 656 Rule Development Schedule" (Eastern Kern Air Pollution District 2007). After review of the CARB control measures, the rule development schedule included new or modified rules related to agricultural operations, windblown dust, and fugitive dust (inactive disturbed land and trackout and carryout).

Rules

The following EKAPCD rules would apply to typical residential development in the study area. All commercial development is assumed to occur in the SJVAB.

- **Rule 402 (Fugitive Dust)** prescribes that emissions of fugitive dust from any active operation may not remain visible in the atmosphere beyond the property line of an emission source and that a construction project employ one or more reasonably available control measures to minimize fugitive dust emissions from each fugitive dust source type which is part of any active operation. Additional requirements are set forth for large operations (operation involving in excess of 100 contiguous acres of disturbed surface area or any earth-moving activity exceeding a daily volume of 10,000 cubic yards three times during the most recent 365-day period).
- **Rule 410.1A (Architectural Coating Controls)** limits VOC emissions from architectural coatings and establishes limits, storage, cleanup, and labeling requirements for architectural coatings.
- **Rule 410.5 (Cutback, Slow Cure & Emulsified Asphalt Paving and Maintenance Operations)** limits VOC emissions by restricting the application and manufacturing of cutback asphalt, slow cure asphalt, and emulsified asphalt for paving and maintenance operations.

- **Rule 416.1 (Wood-burning Heaters and Wood-Burning Fireplaces)** limits emissions of smoke (particulate matter), organic gases and CO from wood burning fireplaces in new housing subdivisions and wood burning heaters throughout Eastern Kern County.
- **Rule 424 (Residential Water Heaters)** limits NO_X emissions from natural gas-fired residential water heaters.

South Coast Air Quality Management District

Attainment Plans

SCAQMD has adopted attainment plans to achieve state and Federal air quality standards to comply with regulatory requirements. The most recently adopted plans are discussed below.

- **2003 Air Quality Management Plan.** The SCAQMD Governing Board adopted the 2003 Air Quality Management Plan (AQMP) on August 1, 2003. The 2003 AQMP updates the attainment demonstration for the Federal standards for ozone and PM_{10}, replaces the 1997 attainment demonstration for the Federal CO standard, provides a basis for a maintenance plan for CO for the future, and updates the maintenance plan for the Federal NO_2 standard that the SCAB has met since 1992. On March 10, 2009, the EPA issued a final rule partially approving and partially disapproving the 2003 AQMD (South Coast Air Quality Management District 2003). On February 2, 2011, the U.S. Court of Appeals for the Ninth Circuit ruled that EPA's partial approval was arbitrary and capricious. The Court further ruled that EPA should have ordered California to submit a revised attainment plan for the South Coast Air Basin after it disapproved the 2003 AQMP and that EPA should have required transportation control measures.
- **2007 Air Quality Management Plan.** The SCAQMD Governing Board adopted the 2007 AQMP on June 1, 2007. This AQMP focuses on ozone and $PM_{2.5}$. The 2007 AQMP includes the same updates as the 2003 AQMP and incorporates significant new scientific data, primarily in the form of updated emissions inventories, ambient measurements, new meteorological episodes, and new air quality modeling tools. As part of the 2007 AQMP, the SCAQMD requested that the EPA "bump up" the ozone nonattainment status from severe to extreme to allow additional time for the South Coast Air Basin to achieve attainment with the Federal standard. The additional time would provide for implementation of state and Federal measures that apply to sources over which the SCAQMD does not have control (South Coast Air Quality Management District 2007). The 2007 AQMP has been approved by CARB; however, on November 22, 2010, the EPA issued a proposed rule to approve in part and disapprove in part the portions related to attainment of the Federal $PM_{2.5}$ standard. The EPA, however, approved the redesignation of the South Coast Air Basin to an extreme ozone nonattainment area, effective as of June 4, 2010. On February 8, 2011, the U.S. District Court for the Central District of California approved a consent decree under which the EPA agreed to sign for publication in the Federal Register a notice of its final action on the portions of the 2007 State SIP and SCAQMD 2007 AQMP that relate to EPA's nonattainment designation of the SCAB with respect to the 1997 Federal $PM_{2.5}$ and ozone standards by September 30, 2011, and December 15, 2011, respectively. The ozone-related portion of this plan was approved by EPA on December 15, 2011. EPA issued a proposed rule partially approving the $PM_{2.5}$-related portion of the 2007 plan. Subsequently on November 9, 2011, EPA issued a final rule approving most of the $PM_{2.5}$ plan with an effective date of January 9, 2012. However, the EPA disapproved the $PM_{2.5}$ plan's contingency measures because they would not provide sufficient emission reductions.

3.4 Geology and Soils

The section describes the geology and soil conditions in the study area. For this section, the study area includes the Covered Lands and the surrounding earthquake fault system that could affect the Covered Lands, as discussed in greater detail below.

3.4.1 Geographic Setting

The study area is located in the western Tehachapi Mountains, a transverse range in southern Kern County, running southwest to northeast to connect the Coast Ranges on the west with the southern end of the Sierra Nevada on the east. The range extends for approximately 40 miles, and the peaks vary in height from approximately 4,000 to 8,000 feet above mean sea level (amsl). The range forms a barrier separating the San Joaquin Valley to the northwest and the Mojave Desert in the Great Basin to the southeast. The range is crossed by Tejon Pass at its southwestern end (providing the route for Interstate 5 [I-5]). This dramatic incline downhill to the San Joaquin Valley floor is regionally referred to as the Grapevine because of the wild grapevines that grow there. The less geographically dramatic Tehachapi Pass is found on State Route (SR) 58 at the range's northeastern end.

3.4.2 Topography

Elevations in the study area range from 2,000 to over 6,000 feet amsl, and the majority of the slopes exceed 25% (Figure 3.4-1). The study area contains major landforms, such as Bear Trap Canyon, Tejon Canyon, Geghus Ridge, and Winters Ridge, and high peaks such as Grapevine Peak (4,750 feet), the ridge south of Lopez Flats (6,500 feet), Diorite Peak (6,674 feet), Liebre Twins (6,413 feet), and Middle Ridge (5,400 to 5,900 feet). The northern portion of the study area lies on the slopes of Bear Mountain (6,934 feet at the peak, which is located outside the boundary of the study area).

The topography associated with the Tehachapi Mountains is a result of the several major faults in the area that bound large blocks of the Earth's crust (Figure 3.4-2). The blocks are in motion adjacent to and along the boundary between the North American and Pacific Plates. The Pacific Plate (on the west) is moving northwestward in relation to the North American Plate (on the east) at a rate of about 2 inches per year. Most of the relative motion between the two plates takes place along the San Andreas Fault, located approximately 2 miles southwest of the study area, although other major faults also carry some portion of the relative motion. The San Andreas is the primary fault in an intricate network that cuts through rocks of the California coastal region. The entire San Andreas Fault system is more than 800 miles long and extends to depths of approximately 10 miles in the earth (Wallace 1990). See additional information about faulting in Section 3.4.6, Secondary Effects of Ground Shaking.

3.4.3 Geology

The study area is located in the southern Sierra Nevada geomorphic province, which includes the southern Sierra Nevada and the Tehachapi Mountains. The Sierra Nevada province contains most of the high mountains in Kern County. Cretaceous granitic rocks underlie most of the southern part of the province. The surrounding Pre-Cretaceous metasedimentary rock protrudes downward into the upper surface of the granitic rock to form roof pendants. Tertiary rocks, consisting of nonmarine sedimentary rocks and igneous rocks, occur locally in the province. Most of the study area consists of Mesozoic Granitic, Pre-Cretaceous Metamorphic, Pre-Cretaceous Limestone, Pre-Cenozoic

Granite, and Adamellite formations. The Sierra Nevada and Garlock Faults form the east and southeast boundaries of the province.

3.4.3.1 Bedrock Units

Most of the study area is underlain by a diverse assemblage of crystalline rocks that include both igneous and metamorphic rock types. Most of the igneous rock types present are plutonic rocks (igneous rocks that solidified underground). These are composed of granite, diorite, and quartz monzonite. These igneous rock types are capped by widely dispersed blocks of metamorphic rock types, including marble and hornfels, which metamorphosed from limestone. Other metamorphic rocks present include schist and quartzite. Geghus Ridge is underlain by schist and quartzite.

3.4.3.2 Surface Deposits

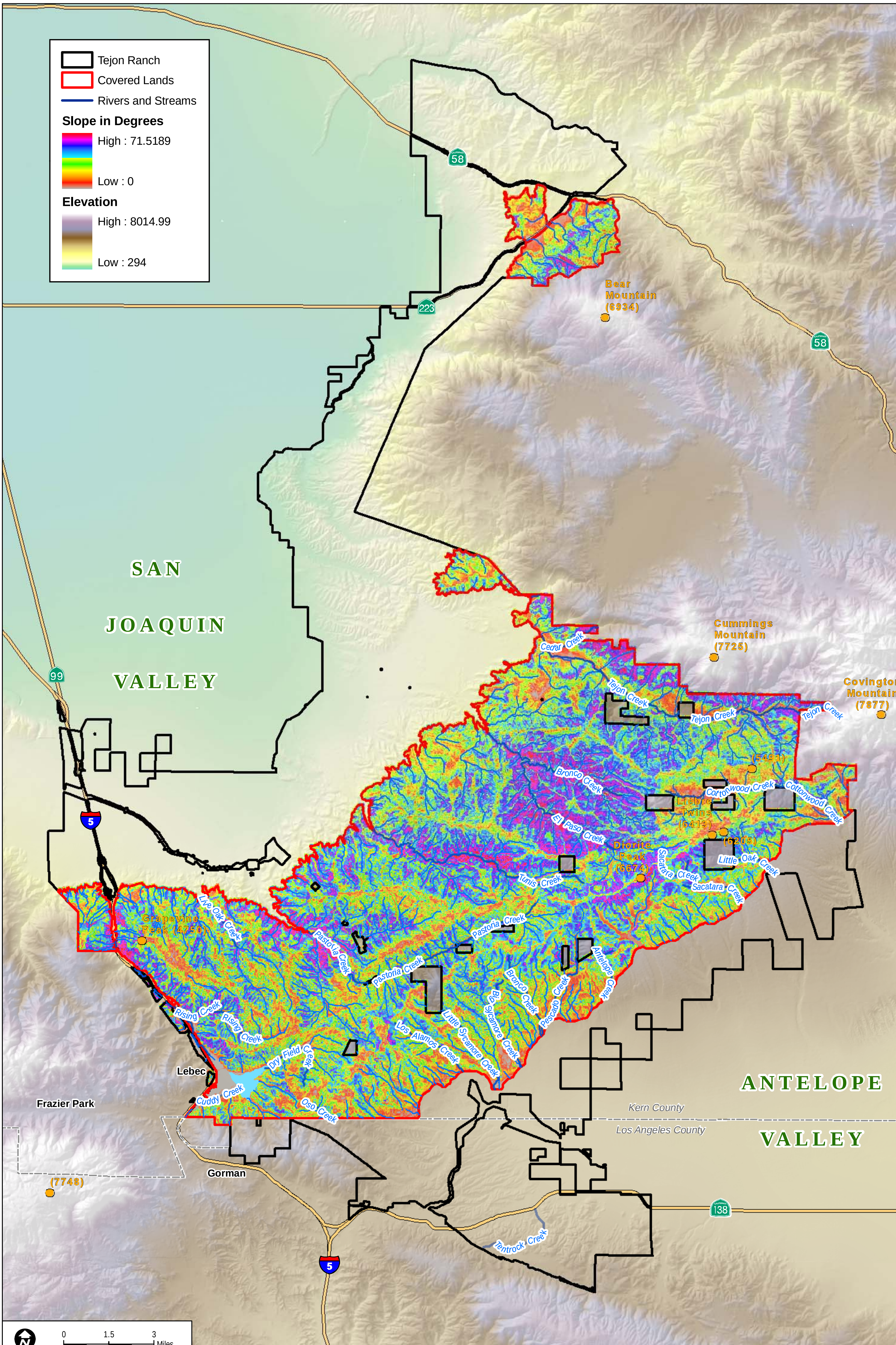
In some of the study area, there are surface deposits above the bedrock units. Younger alluvium, as defined for this analysis, consists of water-deposited materials from the Holocene age (the present and back 10,000 years). Colluvium refers to materials deposited by gravity in upland swales and at the base of slopes. Debris flows consist of a mixture of soil, rock, wood debris, and water that flows rapidly down steep gullies during storms. These types of sediments are present throughout the study area, filling broad valleys, lining narrow canyons, and covering side slopes. These sediments are thickest in the Castac Valley west of Castac Lake, where they are typically 200 to 500 feet deep. In the mountains, many of the larger canyons, such as Crane Canyon and Bear Trap Canyon, are filled with young sediments, and cone-shaped debris aprons at the base of tributary ravines are common. In the northern portion of the study area, the foot of Bear Mountain is also characterized by debris aprons. The colluvium consists predominantly of brown, grayish-brown, and dark brown clayey sand, silty sand, and gravelly sand, which is intermixed and not typically in stratified beds. Evidence for small debris of mudflows is present in the steeper hillside areas.

Sediments dating back to the Pleistocene age (up to 1.6 million years ago) are present, capping some of the highest ridgetops in the study area and appearing in elevated valleys and as remnants of older valley fill near the base of modern drainages. Some deposits, particularly those at lower elevations, have been deeply cut by modern streams and overlain by younger sediments. Many generations of older alluvial deposits are present, the oldest of which caps the highest ridges and represents a prehistoric drainage network that has no relation to the modern topography. These older deposits are estimated to range in age from late Pleistocene (120,000 years old) to early Pleistocene (slightly less than 1 million years old) and possibly as old as the late Pliocene (2 million years old).

Significant amounts of fill have been placed in Bear Trap and Pastoria Canyons as a result of tunnel construction for the California Aqueduct by the Department of Water Resources. On the remainder of the study area, fills are very minor in occurrence and are generally related to road building or excavations made around structures and pipelines.

3.4.3.3 Mineral Deposits

Sand, rock, and gravel are currently being mined at the La Liebre Mine and the National Cement Mine under the terms of mineral extraction leases with Tejon Ranchcorp (TRC). Approximately 3,848 acres of the study area have been mapped as mineral resources zones by the state of California under the Surface Mining and Reclamation Act. These include MRZ-2 areas, which are known to contain mineral resources, and MRZ-3 areas, where the significance of the mineral resources present has not been determined. The locations of these areas are described in more detail in Section 3.7, Community Resources.

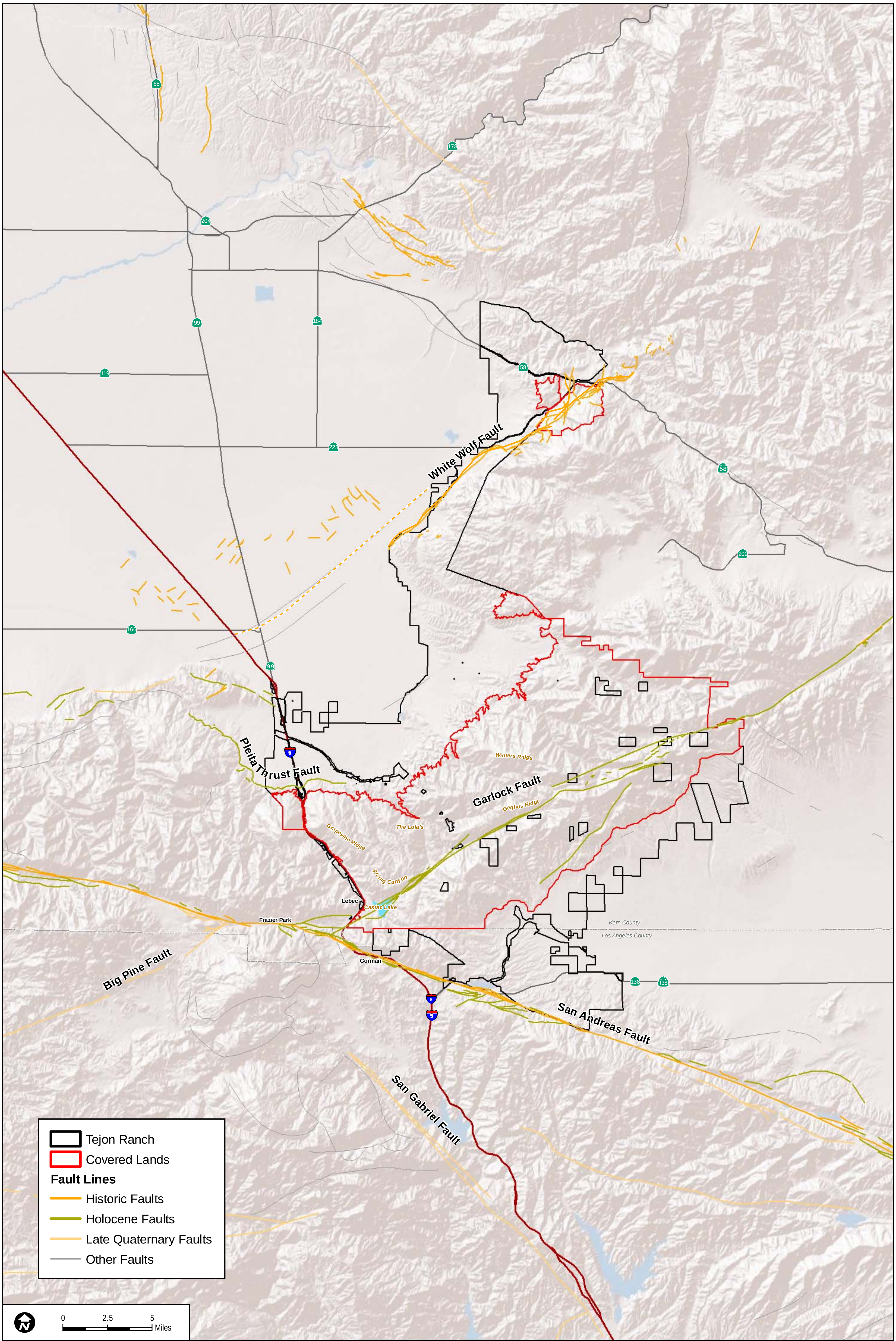


SOURCE: USGS 2011

FIGURE 3.4-1

Topographic Features of Covered Lands

Supplemental Draft Environmental Impact Statement Tehachapi Uplands Multiple Species Habitat Conservation Plan



SOURCE: USGS 2000

FIGURE 3.4-2

Faults in Vicinity of Covered Lands

3.4.3.4 Soils

Soils in the study area are predominantly Walong-Anaverde-Edmundston, Hesperia-Arvin-Whitewolf, and Handford-Greenfield Association based on 1981 data developed by the Natural Resource Conservation Service (NRCS). Only a portion of the study area has been surveyed by the NRCS. The known soil associations that occur within this area are listed below (Natural Resource Conservation Service 1981).

- **Anaheim**: gently sloping to steep (2 to 30%), well-drained loam weathered from fine-grained sandstone or shell; found in the foothills.
- **Avaverde**: hilly to very steep (15 to 75%), well-drained, medium, and moderately coarse-textured residuum weathered from granite and schist; found on mountainous uplands.
- **Arujo**: hilly to very steep (9 to 75%), well-drained loam weathered from igneous and metamorphic rock; found in uplands.
- **Arvin**: nearly level to moderately sloping (2 to 5%), somewhat excessively drained, moderately coarse and coarse-textured alluvium derived from granitic rock; found on alluvial fans, floodplains, and stream terraces.
- **Ayar**: gently sloping to very steep (5 to 75%), well-drained material weathered from decomposed alkaline shales and sandstone; found on rolling hills.
- **Chanac**: gently sloping to very steep (2 to 50%), well-drained loam in weakly consolidated alluvium of mixed origin; found on old terraces.
- **Cibo**: gently sloping to very steep (2 to 75%), well-drained material weathered from igneous rocks; found on foothills and mountainous uplands.
- **Edmundston**: hilly to very steep (15 to 75%), well-drained medium and moderately coarse-textured residuum weathered from granite and schist; found on mountainous uplands.
- **Friant**: hilly to very steep (9 to 75%), well-drained material weathered from mica schist, quartz schist, and gneiss; found on mountainous uplands.
- **Godde**: hilly to very steep (15 to 75%), somewhat excessively drained material weathered schist; found on uplands.
- **Gorman**: moderate to steeply sloping; well-drained, weakly consolidated sediments derived mostly from granitic rock sources; found on rounded hills and weakly defined terraces.
- **Greenfield**: gently sloping (2 to 5%), well-drained sandy loam; found on alluvial fans.
- **Hanford**: gently sloping (2 to 5%), well-drained sandy loam; found on alluvial fans.
- **Havala**: level to steep (0 to 30%), well-drained material formed from mixed alluvium; found on old stream terraces and alluvial fans in mountain valleys.
- **Lebec**: moderately steep to steep, well-drained fine loam; found on mountains.
- **Oak Glen**: nearly level to steep (2 to 25%), well-drained material formed in alluvium derived from granitic rocks; found on alluvial fans and toe slopes.
- **Oakdale**: nearly level to gently sloping (0 to 5%), well-drained alluvium derived from granitic rock sources; found on alluvial fans and terraces.
- **Pleito**: nearly level to very steep (2 to 60%), well-drained material formed in mixed alluvium; found on terraces, fan remnants, erosional remnants, and alluvial fans.
- **Ramona**: nearly level to moderately steep, well-drained material formed in alluvium derived mostly from granitic and related rock sources; found on terraces and fans.

- **Sheridan**: moderate to very steep, well-drained material formed in residuum weathered from granite, schist, and related rocks; found on hills.
- **Soboba**: level to moderate (0 to 30%), excessively drained material formed in alluvium from predominantly granitic rock sources; found on alluvial fans and floodplains.
- **Steuber**: level to hilly (0 to 9%), well-drained mixed alluvium principally of granitic origin; found on alluvial fans and stream floodplains.
- **Tehachapi**: nearly level to steep (2 to %–30%), well-drained mixed alluvium; found on old alluvial fans and terraces.
- **Vista**: gently sloping to very steep (2 to 75%), well-drained material weathered from decomposed granitic rocks; found on hills and mountainous uplands.
- **Walong**: hilly to very steep (15 to 75%), well-drained, medium and moderately coarse-textured residuum weathered from granite and schist; found on mountainous uplands.

These soil types are grouped by soil categories (bedrock, gravelly loams, clay and clay loams or soil complexes) as shown on Figure 3.1-1. Most of the study area is underlain by bedrock, which is not considered compressible or collapsible. Compressible soils are fine-grained soils (silts and clays) that are susceptible to a decrease in volume (i.e., compression) when weight is put upon them. Collapsible soils are granular soils (sands and silty sands) of low density that, when wetted, can break down and cause settlement of the ground surface. Compressible and collapsible soils are limited to the valley floor areas within the study area.

In general, soils and bedrock underlying the study area are not highly expansive. Expansive soils undergo significant volume changes with changes in moisture content, expanding when wet and shrinking as they dry out, resulting in harmful effects on structures and surface improvements. Localized areas of moderately or highly expansive clays occur in some soils in the study area developed from metamorphic rocks and in some deposits of old alluvium.

3.4.4 Landslides and Slope Stability

Landslides and slope stability can be affected by the processes listed below. Steep slopes are more prone to such events and generally consist of the slopes of the ridges identified in Figure 3.4-1.

- **Landslides**. Landslides are common throughout southern California's mountain ranges, particularly near major fault zones, where rock has been weakened by fracturing, shearing, and crushing. Landslides may be caused by seismic shaking, local climatic conditions, or human modification of the affected soils. Many landslides have historically occurred in the study area.
- **Slope Creep.** Slope creep is the deformation and movement of outer soil or rock materials in the face of a slope due to gravity overcoming the shear strength of the material. Soil creep generally occurs on moderate to steep slopes in soils that develop on fine-grained bedrock units. Rock slope creep involves folding and fracturing and is most common in highly fractured, fine-grained rock units, such as siltstone and claystone. Creep can also occur in graded fill slopes, especially in areas subject to alternating periods of wet and dry conditions. Slope creep occurs throughout the study area on canyon side slopes and in soils that have accumulated in swales, gullies, and ravines.
- **Debris Flow.** A debris flow (mudflow, mudslide, debris avalanche) is a rapidly moving slurry of water, mud, rock, vegetation, and debris. Debris flows typically occur on steep slopes and can move at speeds of up to 40 feet per second. Several areas within the study area have been subject to debris flows.

- **Rockfalls.** A rockfall refers to freefalling, tumbling masses of bedrock that break off steep canyon walls and cliffs, generally due to earthquakes or heavy rainfall. Rockfalls could potentially occur in the study area where rocky outcrops are located.

3.4.5 Seismicity and Faulting

As mentioned previously, the study area contains several earthquake faults. A seismic hazards map showing the fault lines is provided in Figure 3.4-3. The presence of these faults creates a risk for moderate to large earthquakes and horizontal ground accelerations within the study area. Table 3.4-1 lists the active and potentially active faults in the vicinity of the study area, the slip rates of each fault, the maximum potential earthquake magnitude (Mmax) for each fault, and when the most recent activity occurred.

The Garlock Fault and the White Wolf Fault are located within the study area. The Garlock Fault zone bisects the southern portion of the study area. This fault zone separates the active basin-and-range extension to the north from the Mojave strike-slip zone to the south. The Garlock Fault terminates approximately 1 mile west of the San Andreas Fault. The White Wolf Fault crosses the northern portion of the study area and is the fault responsible for a Kern County earthquake that reached a magnitude of 7.5 on July 21, 1952. It is an oblique-reverse fault with a dip of about 60 degrees to the south and a left-lateral slip component.

Along the Garlock Fault, a magnitude 5.7 earthquake occurred near the town of Mojave on July 11, 1992. This earthquake is thought to have been triggered by the Landers earthquake, which occurred 2 weeks earlier on the Johnson Valley, Landers, Homestead Valley, Emerson, and Camp Rock Faults. The 1916 magnitude 5.5 earthquake in Tejon Pass may have occurred along the westernmost portion of the Garlock Fault, although it was attributed to the San Andreas Fault. Two major ruptures of unknown magnitude are thought to have occurred along the Garlock Fault in 1500 near Johannesburg in Searles Valley and in 1050 near Tehachapi. Historically, earthquakes along Garlock Fault have not produced surface rupture. However, surface cracks occurred along the fault in 1952 during the Kern County earthquake, which occurred on the White Wolf Fault.

Table 3.4-1. Active and Potentially Active Faults In or Near the Covered Lands

Fault Name	Approx. Distance from Covered Lands (miles)	Slip Rate	Mmax	Estimated Age of Most Recent Activity
Garlock Fault	0	6 millimeters/year	7.3	Holocene
White Wolf Fault	0	2 millimeters/year	7.3	Historic
San Andreas Fault	2	34 millimeters/year	7.4	Historic
Pleito Thrust Fault	2	2 millimeters/year	7	Holocene/Late Quaternary
Big Pine Fault	8	0.8 millimeter/year	6.9	Pre-Quaternary/Late Quaternary
San Gabriel Fault	8	1 millimeter/year	7.2	Late Quaternary/Holocene

Notes: Mmax: maximum earthquake magnitude estimated for a given fault. Actual recorded values may be higher.

The San Andreas Fault extends from the Gulf of California in Mexico to Mendocino County in Northern California. The fault passes approximately 2 miles to the southwest of the study area. The San Andreas Fault system is the primary structural element in California, forming the boundaries between the Pacific and North American lithospheric plates. The slip rate of this fault ranges from 20 to 35 millimeters per year. The most recent earthquake with surface rupture along the San Andreas Fault in the vicinity of the study area was the magnitude 7.9 Fort Tejon earthquake in 1857. This earthquake resulted in a 225-mile right-lateral strike-slip surface rupture, an average slip of 15 feet, and a maximum horizontal ground displacement of 30 feet.

The Pleito Thrust Fault is a complex system of thrust faults, reverse faults, and folds on the northwestern edge of the Tehachapi Mountains. They are believed to dip south under the mountain front and continue east of the mapped surface fault zone as a blind thrust fault. Portions of the Pleito Thrust Fault system may be located under the study area.

The Big Pine Fault is located approximately 8 miles from the study area and is thought to date from the Pre-Quaternary to Late Quaternary Age (the Quaternary Age covers the last 2 million years), but it has not been well studied.[1] The San Gabriel Fault is primarily a right-lateral strike-slip fault, roughly 88 miles in length, extending from the southern end of the San Gabriel Mountains to approximately 8 miles south of the study area.

3.4.6 Secondary Effects of Ground Shaking

Secondary effects from ground shaking caused by seismic activity can result in the following complications related to soils. In the study area, risk of secondary effects from ground shaking would be highest where the following conditions exist.

- **Liquefaction and Related Ground Failure.** Liquefaction involves a sudden loss in strength of a saturated soil caused by strong shaking, such as an earthquake. Typically, liquefaction occurs in areas where depth to groundwater is less than 49 to 66 feet below the ground surface and where the soils are composed of predominantly poorly consolidated sands and silty sands.

  Lateral spreading can occur during an earthquake when liquefaction transforms a subsurface layer of soil into a fluid-like mass. Under these conditions, gravity can cause the fluid-like soils to move downslope and generate several feet of displacement.

  Most of the study area does not have shallow groundwater and is not subject to liquefaction. Groundwater is relatively shallow in certain areas near Castac Lake, and these soils may be susceptible to liquefaction.

- **Seismically Induced Settlement.** Under certain conditions, strong ground shaking can cause loose, dry, or partly saturated sands to densify, resulting in local or regional settlement. Floodplains and bases of hills are particularly susceptible to this type of failure.
- **Ridgetop Fissuring and Shattering.** During an earthquake, seismic energy can be focused along the crest of a ridge and cause fissuring and shattering of ridgetop soils. Near-surface soil-filled fissures have been observed along Geghus Ridge and likely occur in ridgetop areas throughout the study area.
- **Sackungen.** The term *sackungen* (pronounced *sack-ÚN-jen*) refers to landforms found on or adjacent to ridgelines that can generate or become part of an earthquake-related landslide. Sackungen formations are frequently present in mountainous areas near active faults and are found in various locations in the study area.

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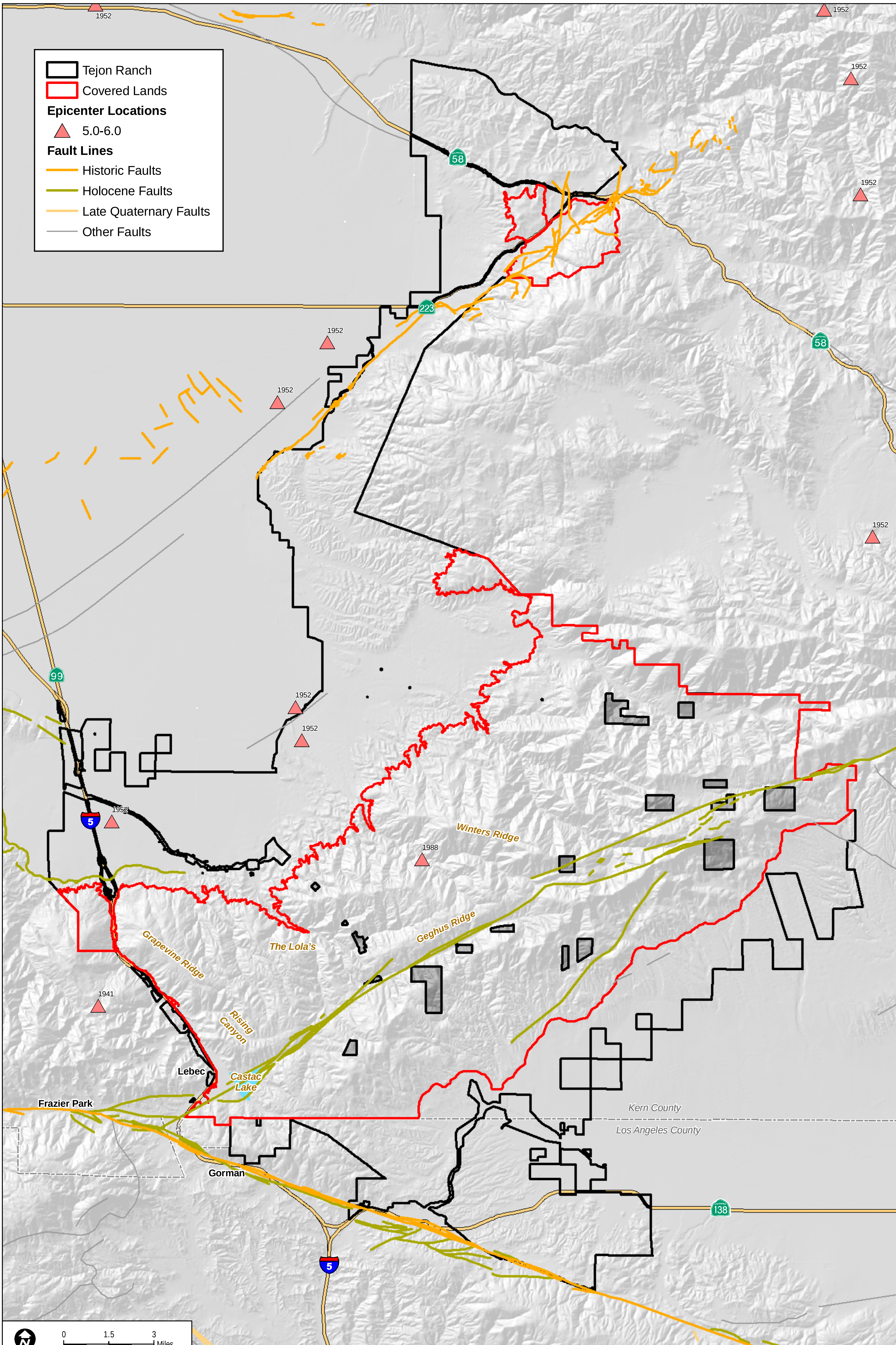
[1] The Quaternary Age refers to the last 2 million years, and the Holocene Epoch refers to the last 10,000–12,000 years.



SOURCE: TRC 2007
USGS 2006

FIGURE 3.4-3
Regional Seismicity

3.5 Cultural Resources

This section describes the cultural and paleontological resources within the cultural resources study area. For this section, the study area is considered concurrent with the Covered Lands. Cultural resources include archaeological, ethnographic, historical, Native American, and architectural resources.

3.5.1 Cultural Resources Setting

3.5.1.1 Prehistoric Chronology

The study area is located in the Tehachapi Mountains and southern San Joaquin Valley region, which has received less archaeological attention compared to other areas of the state. The majority of California archaeological work has been concentrated in the Sacramento Delta, Santa Barbara Channel, and central Mojave Desert areas (Moratto 1984). Although knowledge of the prehistory of the study area is limited, enough is known to determine that the archaeological record is broadly similar to south-central California as a whole and evidence of early use of the study area can be inferred from information gathered from the broader region.

Initial occupation of the region occurred at least as early as the Paleoindian Period, or prior to about 10,000 years before present (YBP). Evidence of this early use of the region has been revealed by the discovery of characteristic fluted and stemmed points found around the margin of Tulare Lake, in the foothills of the Sierra Nevada, on the Carrizo Plain, and in the Mojave Desert proper. These locations are outside the study area, but they suggest general use of the region during this early time period.

Substantial evidence for human occupation of California first occurs during the Middle Holocene, from roughly 7,500 to 4,000 YBP. This period is known as the Early Horizon, and is sometimes alternatively referred to as the Early Millingstone along the Santa Barbara Channel. In this southern area, population was concentrated along the coast, with minimal visible use of inland areas. Adaptation appears to have emphasized hard seeds and nuts, with tool-kits dominated by mullers and grindstones (manos and metates). Minimal evidence of Early Horizon occupation has been found in most inland portions of the state. In part, this may be due to a severe cold and dry paleoclimatic period that occurred at this time. Early Horizon population density appears to have been low and, if any kind of specialized subsistence adaptation existed, it was probably tied to plant food gathering rather than hunting.

Environmental conditions improved dramatically after about 4,000 YBP, during the Middle Horizon. This period is known climatically as the Holocene and it was characterized by significantly warmer and wetter conditions than were experienced previously. Archaeologically, it was marked by a large population increase and movement into new environments along the coast and into the interior south-central portions of California and the Mojave Desert (Whitley et al. 2007).

Along with ritual elaboration, peoples of the Middle Horizon became more specialized in subsistence practices, perhaps correlating with the appearance of the acorn processing technology. Penutian-speaking peoples (including the Yokuts) are thought to have entered the state roughly at the beginning of this period and, perhaps, to have brought this technology with them (Moratto 1984). Likewise, it appears that the so-called Shoshonean Wedge in Southern California, or the Takic speaking groups that included the Gabrielino/Fernandeño, Tataviam, and Kitanemuk, may have moved into this region at this time, rather than at about 1,500 YBP as first suggested by Kroeber (1925).

Evidence for Middle Horizon occupation of interior south-central California is substantial. In northern Los Angeles County along the upper Santa Clara River, for example, evidence suggests occupation extending back to this period, at which time village population may have consisted of 50 or more people. Similarly, the inhabitation of the Lake Piru and Valencia region appears to have begun during this period. To the west, there is little or no evidence for pre-Middle Horizon occupation in the upper Sisquoc and Cuyama river drainages, with population appearing for the first time there at roughly 3,500 YBP. The Carrizo Plain experienced a major population expansion during the Middle Horizon (Whitley et al. 2007). Recent data indicate the Tejon Ranch in the Tehachapi Mountains was first significantly occupied during the Middle Horizon (W&S Consultants 2006). A parallel can be drawn to the inland Ventura County region, the western Mojave Desert, the southern Sierra Nevada, and the Coso Range region where a similar pattern has been identified. In all of these areas, a major expansion in settlement, the establishment of large site complexes, and an increase in the range of environments exploited appear to have occurred sometime roughly around 4,000 years ago.

The beginning of the Late Horizon is set variously at 1,500 and 800 YBP, although a consensus seems to be developing for the shorter chronology for this time period. In fact, there is increasing evidence for the importance of the Middle-Late Horizons transition, from roughly AD 800 to 1200, in the understanding of south-central California. This corresponds to the so-called Medieval Climatic Anomaly, a period of climatic instability that included major droughts and resulted in demographic disturbances across much of the west (Jones et al. 1999). It is also believed to have resulted in major population decline and abandonments across south-central California, involving as much as 90% of the interior populations in some regions, such as the Carrizo Plain (Whitley et al. 2007). It is not yet clear whether this site abandonment was accompanied by a true reduction in population or instead an agglomeration of the same numbers of peoples into fewer but larger villages in other areas. What is clear, however, is the fact that Middle Period villages and settlements were widely dispersed across the landscape, including many locations that lack contemporary evidence of fresh water sources. Late Horizon sites, in contrast, are typically located where fresh water was available during the historical period, if not currently.

The subsequent Late Horizon can be best understood as a period of recovery from a major demographic collapse. One result is the development of the regional archaeological cultures that are the precursors to ethnographic native California. That is, the ethnographic life-ways recorded by anthropologists are believed to extend back into the past for roughly 800 years.

3.5.1.2 Ethnography

The Tejon Ranch region was a contact area between five Native American ethnographic groups immediately prior to the arrival of Euro-Americans in California: the Kitanemuk, Southern Valley Yokuts, Interior Chumash, Tataviam, and Kawaiisu. Of these five, the Kitanemuk, Interior Chumash, Yokuts, and Tataviam are likely to have lived in or used the study area.

The Kitanemuk occupied the south and central heart of the Tehachapi Mountains and the adjacent northwestern end of the Antelope Valley. These people were speakers of the Serran branch of the Takic (Uto-Aztecan) language stock. The Kitanemuk, sometimes referred to as Haminat, may have occupied parts of the upper Pastoria Creek area and the mountainous zone to the east. Interior Chumash, probably speakers of Ventureño Chumash, a Hokan language, controlled upper Piru Creek, Grapevine Canyon, and the Gorman area. Their domain extended eastward beyond Castac Lake, where the historic village of Kashtiq was located. The San Joaquin Valley floor was occupied by the Yokuts, whose territory extended west to the crest of the Temblor Range, and northwards into the foothills of the Sierra Nevada. The northern section of the study area, in the vicinity of State Routes (SRs) 58 and 202, was occupied by the Yokuts. A wedge of Tataviam people, speakers of a Takic language stock, extended north up into the Tehachapi Mountains. The Tataviam separated the

Chumash from the Kitanemuk, perhaps by controlling the headwaters of Pastoria Creek. They also occupied the Liebre Mountains, south of the study area, and probably the westernmost end of the Antelope Valley.

Despite possible political differences, the groups were culturally very similar. Each group followed a hunting-gathering subsistence lifestyle that was closely tied to terrestrial resources. Their subsistence emphasized the acorn-bearing oak, with the addition of a wide variety of other plants and game. Like many south-central California groups, they may have been organized into recognized and distinct tribelets. These were land-owning groups linked by shared territory and descent from a common ancestor. Each tribelet was headed by a chief who had a variety of assistants. The village also included a shaman, a religious figure without political authority.

The Interior Chumash, unlike the other groups, were tied to the complex Chumash society along the Santa Barbara coast. Kashtiq, which appears in the records of the San Fernando, Ventura, and Santa Barbara missions, is a locally relevant and well known aboriginal place. This site has been identified by various anthropologists as a historic Chumash village at the eastern end of Castac Lake. This site was occupied during the Mission Period and was abandoned by the time the Sebastian Reserve was established. The Sebastion Reserve was created in 1853 on Tejon Ranch (but not on the portion located in the Covered Lands) and was the first Native American reservation in the United States.

During and after the Mission Period, different tribal groups lived together as a result of mission conditions. This resulted in an increase in inter-Tribal marriage and interaction. The Tejon Ranch area became a multiethnic refuge for many Native Americans culminating in the creation of the Sebastian Reserve.

Claims were made and substantiated in U.S. courts that the entire Sebastian Reserve had been located on private land that had been granted by the Mexican government. Because Congress' original intent was to establish the reservation only on public lands, Congress terminated the reserve in 1864. Many of the remaining Native American inhabitants moved to a reservation near Porterville, on the Tule River in Tulare County. Descendants of residents of the ranch, many of whom continue to reside in Kern County, are known as the Tejon Tribe. Historical accounts of the relocation of Native Americans off the Tejon Ranch have been chronicled by various sources (e.g., Frank Latta's *Saga of Rancho El Tejon* (1976) and George Harwood Phillips' *Bringing Them Under Subjection* (2004)). However, aside from the Kashtiq village, the historic occupation of Tejon Ranch by Native Americans was heavily focused on large villages at or near the San Joaquin Valley Floor, not within the study area. Some of the well-known historic villages on the Valley Floor and outside of the study area include Tecuya, Tutruw, Tsuitsaw, and Mat'apxwelxwel.

3.5.1.3 History

The first documented contact between the Native Americans and European explorers in the region occurred in 1772 during the Spanish Period, which lasted from 1769 to 1822. Contact occurred when an expedition led by Pedro Fages passed through Tejon Pass into the southernmost part of the San Joaquin Valley. Fages visited a native village on the shore of Buena Vista Lake before leaving the Central Valley for the San Luis Obispo area to the west. It is possible that Fages took a shortcut in the low gap at the neck of Wheeler Ridge west of the study area. Buena Vista (beautiful view) applies to a lake, hills, and a native village, and all were named by Fages. Buena Vista Lake is distinguished as being the oldest place name in the San Joaquin Valley (Hoover et al. 1962).

Active exploration of the southern portion of the San Joaquin Valley did not occur until 1806, when the expedition commanded by Lieutenant Francisco Ruiz entered the area and named the Cañada del Tejon (Badger Canyon) after a dead badger found at its entrance. No missions were established in the area during this time. The town of Lebec was named after Pierre Lebec, who was killed by a grizzly bear on October 17, 1837, near the later site of Fort Tejon. Lebec was most likely a French-

Canadian trapper working for the Hudson's Bay Company. Apparently, Lebec shot and wounded the grizzly before it killed him near the tree under which he lies buried. After his death, Pierre Lebec's name, the date he died, and a short description of how he died were carved into an oak tree located in the northeast corner of the old Fort Tejon parade grounds, 8 miles north of the town of Lebec.

During the Mexican Period (1822 to 1846), General Edward Fitzgerald Beale made several land grants in the southern San Joaquin Valley. These included San Emidio, El Tejon, Castac, Los Alamos y Agua Caliente, and La Liebre. All but one of these grants, Rancho San Emidio, eventually became Tejon Ranch. General Edward Fitzgerald Beale was responsible for the accumulation of land that eventually formed what is now Tejon Ranch. Beale was commissioned as Brigadier General of the California State Militia. In 1848, Beale was the first to bring official news of the discovery of gold to Washington D.C. In 1852, President Fillmore appointed Beale as Superintendent of Indian Affairs for California and Nevada, and it was Beale who established the Sebastian Indian Reservation near the Tejon Ranch Old Headquarters in 1853.

During the American Period (post 1946), California was ceded to the United States as an outcome of the Mexican American War of 1846 to 1848. During this time, Fort Tejon, also known as Camp Cañada de las Uvas, Camp Tehone, and Camp Tehon, was established by the U.S. Army in 1854 on property that was later part of Tejon Ranch. A small town, also called Tejon or Fort Tejon, sprang up approximately 0.5 mile from the Fort's parade grounds. In 1860, this small town consisted of four stores, two saloons, and a brothel with "several cabins servicing the army post."

In 1858, Fort Tejon "was the third largest settlement in the southern half of the state" (Crowe 1957). The Federal census of 1860 listed the population of Fort Tejon as 920, while Los Angeles was listed as 4,385 and El Monte as 1,004 (Crowe 1957). The military outpost at Fort Tejon was officially abandoned on September 11, 1864, and was eventually sold to Samuel A. Bishop of Los Angeles later that year (Hoover et al. 1962). In 1939, Tejon Ranch donated Fort Tejon to the California Department of State Parks.

Today, Tejon Ranch comprises approximately 270,365 acres (422 square miles), making it the largest contiguous privately owned parcel in California. Ranching and grazing uses are similar to ranching and grazing practices over the past 100 years. These land uses contribute an important element to the historic context of the Covered Lands.

3.5.2 Results of the Records Search, Field Surveys, and Native American Consultation

To further characterize potential cultural resources in the study area, a records search was conducted at the South Central Coastal Information Center (for Los Angeles County records) and the Southern San Joaquin Valley Information Center (for Kern County records). The results of the records searches indicated the majority of the study area had not been previously surveyed for cultural resources. Surveys that had been previously completed were located along existing roadways and utility rights-of-way and are primarily located in valley bottoms.

To support compliance with Section 106 of the National Historic Preservation Act, the Service submitted further site evaluation results to the State Historic Preservation Office for review and consideration. These site evaluations were completed for the TMV Planning Area and the Lebec/Existing Headquarters Area. Specifically, Phase I (2004), Phase II (2005), and addendum (2008) studies were conducted in the full TMV Planning Area by W&S Consultants (2006) and are appended to the Tejon Mountain Village EIR (Kern County 2009). An intensive inventory and evaluation was prepared by ASM Affiliates for a potential communications tower area and the Lebec/Existing Headquarters Area (2010). In the TMV Planning Area, the Phase I study identified 58 cultural resource sites. None of the sites are located in the Oso Canyon Development Envelope, two are located on the border of the West of Freeway area, and 33 potentially eligible sites are located within the TMV Specific Plan Development Envelope. The Phase II investigation further evaluated these 33 sites and concluded that 11 lacked sufficient integrity to be deemed eligible for listing in the National Register of Historic Places. The remaining 22 sites are potentially eligible for listing in the National Register of Historic Places. The 22 sites consist predominantly of prehistoric camps, rock rings and bedrock mortar stations, but also include a prehistoric village site, an historic camp, and the site of the historic village of Kashtiq, which was previously capped. In the Lebec/Existing Headquarters Area two previously unidentified cultural resources were identified: an undated bedrock milling site and an extension of Fort Tejon. Neither site was determined to be eligible for listing in the National Register of Historic Places. No cultural resource sites were identified within the evaluated as a potential communications tower area. The SHPO has concurred with these findings.

In addition, the Native American Heritage Commission (NAHC) has been consulted on various occasions to evaluate the potential for Native American cultural resources to occur within the study area. In 2005, Kern County requested a search of the Sacred Lands file for the TMV Planning Area. As indicated above, the area was subsequently surveyed with monitoring provided by the California Indian Council and the Chumash and Tejon Indian Tribes. On July 13, 2009, NAHC sent a letter to Kern County stating the Sacred Lands File search revealed no Native American cultural resources within the TMV Planning Area.

On June 27, 2007, the Service sent a letter to the NAHC to request a search of the Sacred Lands file, identifying the Covered Lands and calling out the Condor Study Area and the Area of Potential Effect. NAHC's response, dated June 29, 2007, stated that the “sacred land file has failed to indicate the presence of Native American cultural resources in the immediate project area.”

An additional request to the NAHC was submitted by ASM Affiliates on December 15, 2010, for the Lebec/Existing Headquarters Area. On December 16, 2010, the NAHC responded, “Native American cultural resources were identified within 0.50 mile of the area of potential effect.”

3.5.3 Paleontological Setting

Paleontological resources are the fossil remains of life that existed in prehistoric or geologic times and can include plants, animals, or other organisms. The study area is located in the Tehachapi and San Gabriel Mountains on the southern end of the Central Valley. The Central Valley is an enormous, elongated depression lying between the Coast Ranges and the Sierra Nevada. The study area is underlain by a complex series of major fault systems, including the White Wolf and Garlock Faults. In addition, the San Andreas Fault passes approximately 2 miles to the south of the study area. The Mojave Block, located north of the San Andreas Fault and south of the Garlock Fault, has been rotated by movement along these fault systems, further complicating the geology of the region. Sedimentary deposits, which have the potential to contain Pleistocene fossils, can be found in the valley bottoms and in small areas near Castac Lake. The small areas near Castac Lake contain features that could contain paleontological resources such as older Pleistocene sediments, middens, or caves, although surveys have not detected any such resources. However, the majority of the study area is underlain by igneous and metamorphic rocks of the mountain plutons, which are not known to yield fossiliferous material. The uplifted region of Wheeler Ridge is Quaternary (Pleistocene) nonmarine terrace deposits.

3.6 Visual Resources

This section describes the visual resources in the study area. For this section, the study area includes the corridors along Interstate 5 (I-5) from State Road (SR) 128 to SR 99, SR 58, and SR 223, and the adjacent communities. The characterization of the study area viewsheds is based on field reconnaissance conducted by visual resource specialists between 2005 and 2008 and again in 2010 and 2011.

3.6.1 Visual Character

The study area includes I-5, Fort Tejon State Historic Park and the community of Lebec along the western border of the Covered Lands and SR 223 and SR 58 are to the north of the Covered Lands (Figure 3.6-1). There are no scenic highways in the study area. The nearest scenic highway is I-5 between Interstate 210 (I-210) near Tunnel Station, and SR 126 near Castaic (California Department of Transportation 2008).

3.6.1.1 Land Form and Topography

The study area is located in the Tehachapi Uplands, which are generally at or above an elevation of 2,000 above mean sea level (amsl) on the north (San Joaquin Valley) side of the Tehachapi Mountains, and generally above 3,500 amsl on the south (Antelope Valley) side. The maximum elevation of the Tehachapi Uplands is approximately 7,000 feet amsl. The topography of the study area includes rugged terrain incised by narrow canyons.

Castac Lake is a point of visual interest in the study area. It is an approximately 400-acre natural lake located in the southwestern portion of the study area just east of in the Castac Valley (Figure 3.6-1). This is the only naturally occurring lake in the study area. The lake is visible to motorists on I-5 and from certain portions of the mountain communities located to the west of the study area. There are no rivers designated as wild and scenic in the study area (California Public Resources Code Section 5093.54) (Bureau of Land Management et al. 2011).

3.6.1.2 Vegetation

As described in Section 3.1, Biological Resources, the primary vegetation in the study area is oak savannah dominated by valley and blue oak. Oak woodlands dominated by canyon live oak and interior live oak are present along some steep canyons on north- and east-facing slopes and in some canyon bottoms. The southeast slopes of the Tehachapi Mountains support a mixed oak-chaparral community that varies in composition depending on elevation, slope, and exposure. A white fir-black oak community is located near the vicinity of the upper reaches of the hillsides that border the Tunis Creek and El Paso Creek drainages. Large sycamore, cottonwood, and willow trees are present along major drainages.

Onsite vegetation can be observed from many locations in the San Joaquin Valley, the mountain communities to the west, and roadways and local communities located to the north and east of the study area. Depending on rainfall conditions, wildflowers bloom on certain hillsides in the study area. These displays can be observed from I-5 and other roadways near exposed hillsides in the study area, and can affect the seasonal color and hue of the area when observed from more distant locations.

3.6.1.3 Land Uses

The study area includes the community of Lebec, which has lower-density rural development, Fort Tejon State Historic Park and Tejon Ranch. The ranch and outlying areas of Lebec have a unified mountain ranching character with a rural and open rangeland appearance. The primary land use in the study area outside of the community of Lebec is grazing. Grazing tends to emphasize the visual distinction between areas dominated by large shrubs and trees and the more open grassland or smaller shrub ranges in which cattle and other domesticated animals feed. Other land uses in the study area include residential, commercial, institutional and industrial land uses in the community of Lebec, , farming and Fort Tejon State Historic Park. .Within the Covered Lands, uses include Tejon Ranchcorp (TRC) headquarters and ancillary ranch structures, and limited built infrastructure, such as farming and irrigation water diversion equipment, ancillary ranch structures and back-country cabins, fences, and buildings associated with the Lebec/Existing Headquarters Area.

Views of lands uses from the I-5 corridor and surrounding mountain communities are dominated by grazing, open space and natural landforms, but also include views of orchards and vineyards, access roadways, TRC headquarters buildings, and lake maintenance activities. Utility corridors can be observed from many locations in and around the study area. Other land uses, including occasional filming and hunting, are relatively small in scale and do not represent a significant visual element in the study area.

3.6.1.4 Light and Glare Conditions

Current sources of nighttime light and glare occur at the structures and facilities of the TRC headquarters and from vehicle headlights used for ranch purposes. Light and glare associated with the headquarters area and adjacent activities are visible from local roadways, commercial areas, and residences in and near the mountain communities.

The mineral extraction activities located on the southern face of the Tehachapi Mountains generate a substantial amount of nighttime light and glare visible at a distance as a light cone above the mining site and from locations along SR 138.

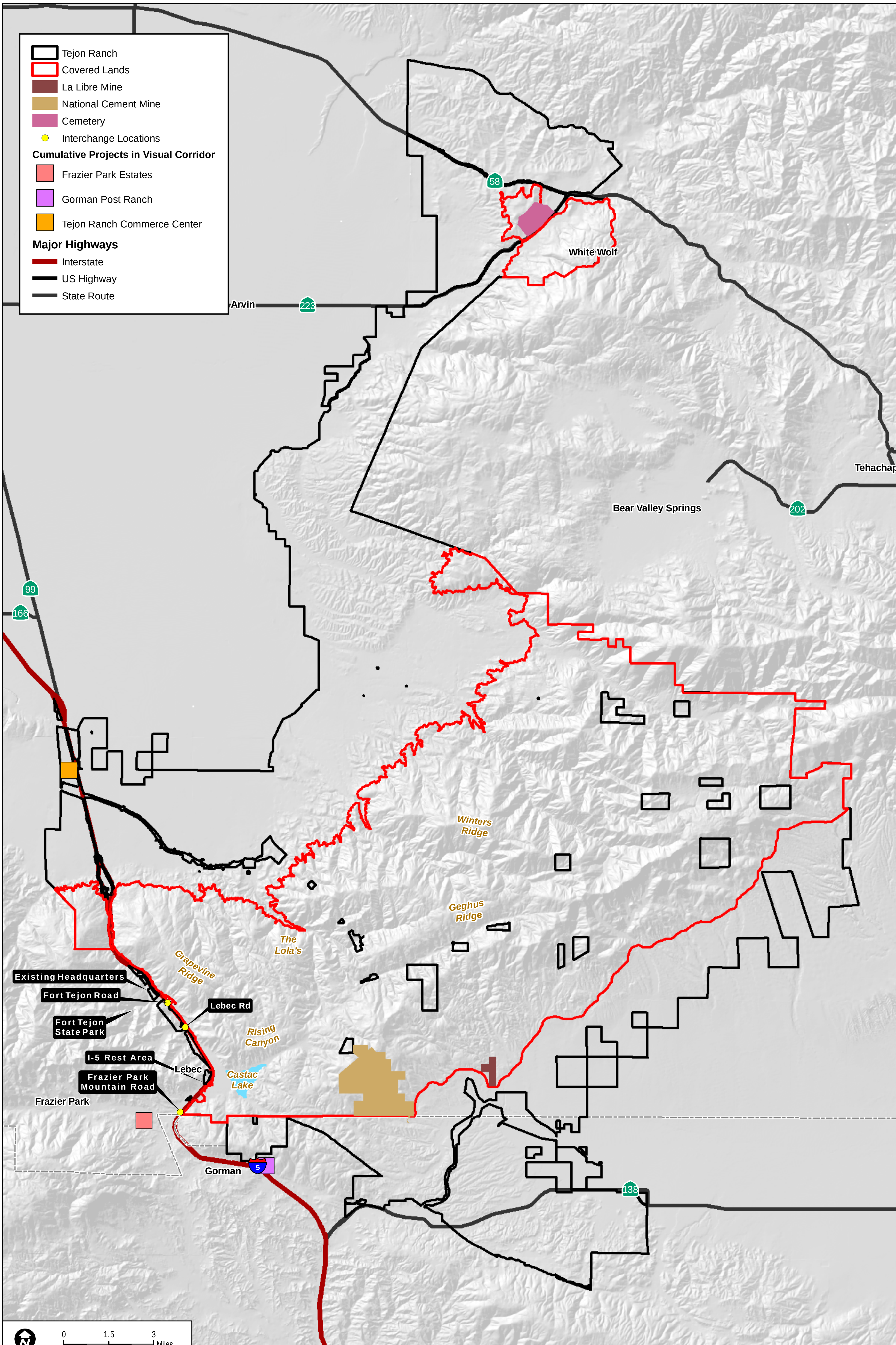
The study area is characterized by rural land use patterns with limited sources of light and glare. The exception is commercial uses located at the Frazier Mountain Road interchange with I-5 where travel-related businesses are primary sources of light and glare in the study area.

3.6.2 Visual Resource Reconnaissance

3.6.2.1 Viewsheds

A viewshed refers to all surface areas visible from the viewpoint of an observer(s). Using methodology developed by the U.S. Federal Highway Administration, in association with the American Society of Landscape Architects, viewsheds can be divided into three distance zones, depending on the distance from the viewer(s) (U.S. Federal Highway Administration no date):

- **Foreground.** Foreground viewsheds are close enough for the viewer to see some extent of the larger visual elements such as landform, vegetative cover, and land use patterns, and also more



SOURCE: USFS 2009
Kern County 2010

FIGURE 3.6-1
Visual Setting

detailed visual elements such as colors and texture, and more detailed elements in the viewshed such as signs, structural elements, and individual plants.

- **Middleground.** Middleground viewsheds are located slightly farther away and allow the viewer to see larger visual elements, such as landform, vegetative cover, and land use patterns. In the middleground, generally only larger structural elements are visible and not individual plants, with the exception of large trees.
- **Background.** Background viewsheds are located in the distance and allow the viewer to see only large visual elements such as landform, large areas of vegetative cover, and major land use patterns, with individual structural elements and even the largest plants not being individually discernible.

3.6.2.2 Sensitive Viewers

Sensitive viewers in the study area consist of motorists on the adjacent public roadways, people living and working in the surrounding communities (residents, business, schools), and visitors to the Fort Tejon State Historic Park, located to the south of I-5. Views to and from the study area with respect to these groups are discussed in greater detail below.

There is no general public access to most of the study area and no public recreation opportunities. The Tejon Ranch Conservancy provides limited docent-led hikes, and guests of TRC or licensees who enter the property by invitation or permit to recreate, hunt or do commercial filmmaking are not considered sensitive viewers for the purposes of this analysis. Views of the Covered Lands are somewhat limited to public roadways and surrounding commercial and residential areas located on the outskirts of the study area.

Foreground viewsheds of the Covered Lands are available primarily along area roadways, including I-5 along the western border and SR 223 and SR 58 to the north. None of the public roadways visible within the study area are designated scenic highways. A 16-mile-long segment of I-5 traverses through the southwestern portion of the study area, from near the Frazier Mountain Park Road interchange through Tejon Pass and down to the San Joaquin Valley floor. The TRC headquarters facilities, the adjacent school and playfields, and the adjacent hills with displays of seasonal wildflowers comprise foreground viewsheds throughout this corridor. Foreground viewsheds from SR 58 and SR 223 consist of views of the sloping topography, seasonal vegetation, and existing land uses located within this area. It is also possible to see background viewsheds consisting generally of open space and sloping topography in the distance.

Foreground viewsheds of the Covered Lands are also visible from the Fort Tejon State Historic Park, which is located immediately adjacent to the study area west of I-5. Foreground views of the Covered Lands are limited to approximately 900 feet because the canyon topography surrounding the park limits more extensive views. Foreground views from Fort Tejon include views of the TRC headquarters and related development immediately across I-5; middle ground views of the Covered Lands are blocked by the intervening topography.

Middleground viewsheds of the Covered Lands are visible from certain residential areas, roadways and commercial locations located in the mountain communities to the west and at commercial areas along the I-5 corridor at the Grapevine interchange and other highway commercial areas along I-5 and SR 99. Views of the Covered Lands from residences along the I-5 corridor adjacent to the study area consist of views of open space, including hills, vegetation, and Castac Lake. Middleground views from these locations extend up to 3 miles when not blocked by topography. The topography, seasonal vegetation, and land uses in the viewshed middleground can generally be perceived with less detail than from viewshed foregrounds. Only larger-scale development (e.g., the California Aqueduct, National Cement Company of California, and large utility easements and facilities) are visible at these distances.

Background viewsheds are visible to viewers traveling along these major roadways and in commercial areas and communities along the I-5 corridor and surrounding area. This includes most of SR 223, SR 138, SR 58, as well as Antelope Valley locations to the east, and communities to the north and east, such as Arvin, Keene, Tehachapi, and portions of the Bakersfield metropolitan area. Background views include more sweeping views of the landscape, which consist largely of open space areas with some scattered residential and commercial land uses as indicated above. In general, only large-scale land uses that affect a significant portion of the study area are visible from these locations.

3.7 Community Resources

This section describes community resources in the study area. For this section, the study area is considered concurrent with the Covered Lands with the exception of demographic data pertaining to socioeconomics and environmental justice, which is presented in the context of Kern County. Topics addressed in this section include the current land uses and land use designation; land resources, including agricultural and mineral resources; socioeconomic conditions; hazardous materials and other hazards; and public services and utilities.

3.7.1 Land Uses and General Plan Designations

3.7.1.1 Existing and Approved Land Uses

As shown in Figure 3.7-1, the majority of the study area consists of open space. Livestock grazing is the predominant land use in this area. Other ongoing ranch uses that occur in open space areas include agricultural operations, filming activities, and some recreational use. Although limited recreation activities are available to the public, these activities occur entirely on private lands and require permission from Tejon Ranchcorp (TRC). Examples of existing recreational land uses include limited Tejon Ranch Conservancy docent-led hikes, hunting and game activities, bicycling, hiking, horseback riding, and use of back-country cabins.

The majority of developed land uses are located in the southern and western portion of the study area along the Interstate 5 (I-5) corridor (Figure 3.7-1). In this area, there are also some agricultural uses (small orchards and vineyards located near Castac Lake), mineral extraction activities (in the National Cement Mine and La Liebre Mine lease areas), and residential and commercial developments (near the northern end of Lebec Road east of I-5). The TRC headquarters complex (including associated structures, such as corporate headquarters buildings, an antique shop, a post office, a church, and single-family residences) is located at along Lebec Road on the east and west sides of I-5. Utility corridors and antennae farms also occur in the study area. For more information about utility corridors and associated facilities, including the California Aqueduct, see Section 3.7.5.5, Utilities.

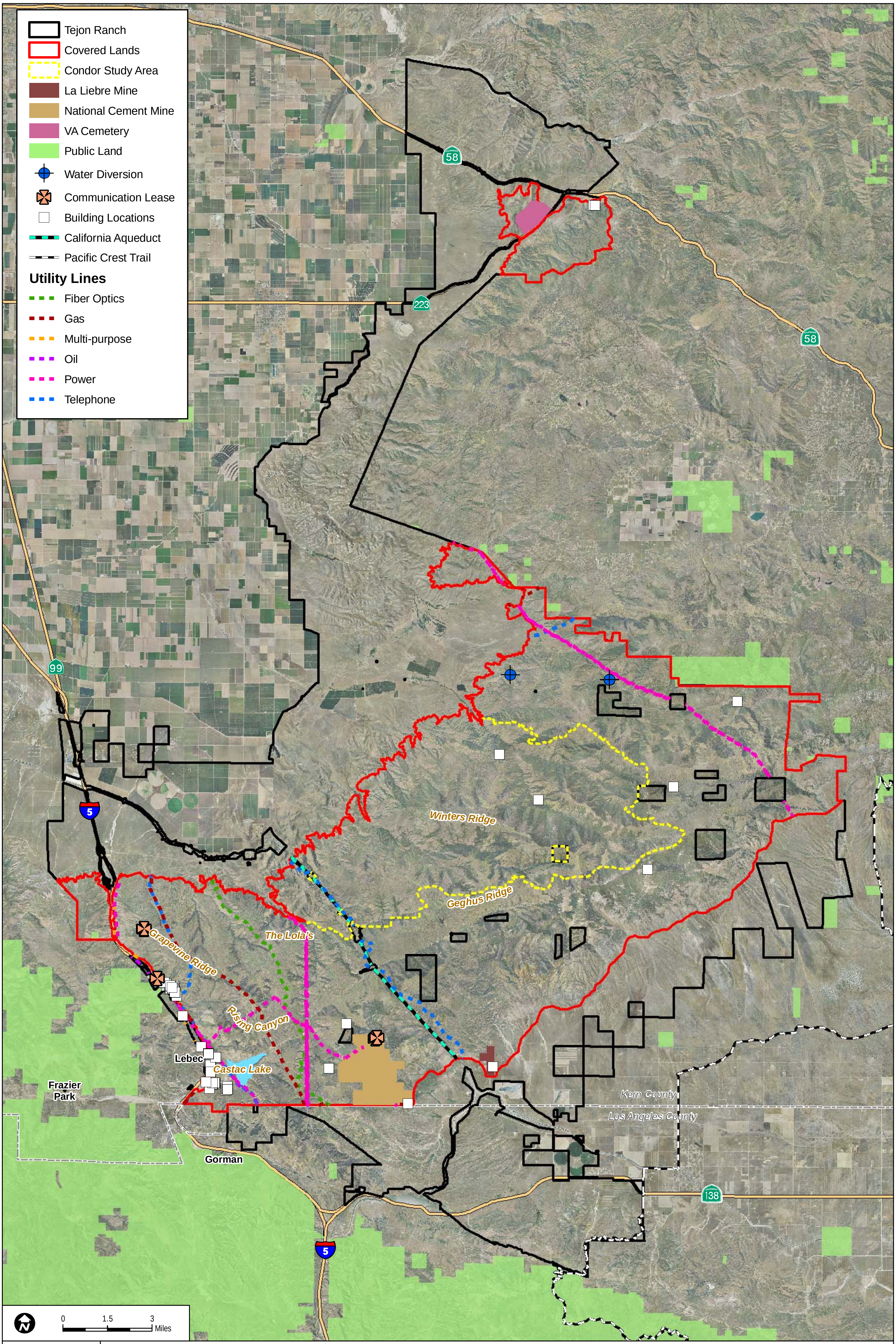
3.7.1.2 Kern County General Plan Land Use Designations

The study area is located solely within Kern County and contains no incorporated cities. As a result, Kern County exercises the primary land use regulatory authority over the Covered Lands.

Kern County adopted a general plan in 2004 that was last amended with changes to certain land use designations made together with the County's approval of the TMV Project in 2009 (Kern County 2009a). The general plan land use element identifies certain classes of land uses that are consistent with Kern County's planning goals and objectives throughout the area of its jurisdiction. The portions of the County that are subject to each general plan land use designation are identified by a corresponding map code on maps that are maintained by Kern County. Figure 2-3 identifies the locations of the existing general plan land use designations applicable to the Covered Lands, including those listed below.

- **State or Federal Lands (Map Code 1.1).** Kern County Map Code 1.1 designates property under the ownership and control of state or Federal agencies. The general plan land use designations and corresponding map codes are not updated on a continuous basis. As a result, certain designations and codes may not precisely correspond with current ownership patterns. At one time, approximately 670 acres of state or Federal Lands were located in the study area, most of which were owned by the Bureau of Land Management. TRC subsequently acquired the majority of the Kern County Map Code 1.1 lands in the study area. At present, approximately 98 acres of the study area are owned by state agencies, including ranch inholdings used by the California Department of Water Resources (DWR) in conjunction with the California Aqueduct, and 1 acre by the Bureau of Land Management.

- **Other Facilities (Map Code 3.3).** Kern County Map Code 3.3 identifies existing facilities used for public or semipublic purposes. The Kern County Fire Department's Lebec Substation and a California Department of Transportation (Caltrans) maintenance facility and I-5 rest area are located in the study area and are subject to the Kern County Map Code 3.3 designation, for a total of approximately 1 acre.
- **Accepted County Plan Area (Map Code 4.1).** Kern County Map Code 4.1 identifies areas for which specific land use plans (specific plans or similar planning documents) have been prepared and approved by Kern County. Portions of the O'Neil Canyon Specific Plan and the Frazier Park/Lebec Specific Plan, totaling approximately 340 acres, are located in the study area west of I-5. Land uses in areas subject to a Kern County Map Code 4.1 designation are subject to the provisions of the applicable specific plans approved by Kern County.
- **Specific Plan Required (Map Code 4.3).** Kern County Map Code 4.3 identifies areas in which subsequent land uses will be finalized by the consideration and approval of a specific plan to be proposed by the applicable landowners. In general, the Kern County Map Code 4.3 designation pertains to portions of the County for which significant projects were previously proposed or discussed with Kern County. Appendix C of the general plan identifies certain dwelling unit, commercial, and other yields associated with each area that is subject to a Kern County Map Code 4.3 designation. Pursuant to the general plan, these yields are subject to additional assessment and evaluation during the specific plan review and related state and Federal permit processes as applicable. Kern County is not required to approve proposals that incorporate the identified yields. Approximately 4,035 acres of the study area are in the 4.3 designations.
- **Residential–Minimum 5 Gross Acres per Unit (Map Code 5.7).** Kern County Map Code 5.7 refers to areas subject to low-density residential uses that may have physical constraints and that do not require connections to public water and sewer infrastructure. A small portion of the study area (22 acres), located in the extreme north, is subject to the Kern County Map Code 5.7 designation.
- **Resource Reserve (Map Code 8.2).** Kern County Map Code 8.2 identifies areas that exhibit mixed natural resource characteristics, such as rangeland, woodland, and wildlife habitat. Parcels up to a minimum of 20 acres are allowable under the Kern County Map Code 8.2 designation, except that the minimum parcel size for lands subject to Williamson Act or farmland security zone contracts is 80 acres. Approximately 62 acres of the study area are subject to the Kern County Map Code 8.2/20-acre minimum designation, and 699 acres are subject to the Kern County Map Code 8.2/80-acre minimum designation.
- **Extensive Agriculture (Map Code 8.3).** Kern County Map Code 8.3 identifies areas subject to agricultural uses that involve large amounts of land with relatively low value-per-acre yields, such as livestock grazing, dryland farming, and woodlands. Parcels up to 20 acres are allowable under the Kern County Map Code 8.3 designation, except that the minimum parcel size for lands subject to Williamson Act or farmland security zone contracts is 80 acres. Approximately 10,857 acres of the study area are subject to the Kern County Map Code 8.3/20-acre minimum designation, and 74,239 acres are subject to the Kern County Map Code 8.3/80-acre minimum. Together, the Kern County Map Code 8.3 designations account for approximately 60% of the study area.



SOURCE: California Resource Agency 2011

FIGURE 3.7-1

Existing Land Uses on Covered Lands

- **Mineral and Petroleum (Map Code 8.4).** Kern County Map Code 8.4 refers to areas that produce or could potentially produce petroleum, natural gas, geothermal resources, or mineral deposits of regional or statewide significance. Kern County Map Code 8.4 areas encompass approximately 6,374 acres of the study area and are generally located along the southeastern face of the Tehachapi Mountains.
- **Resource Management (Map Code 8.5).** Kern County Map Code 8.5 identifies open space lands containing important resource values, such as wildlife habitat, scenic values, or watershed recharge areas. Parcels up to 20 acres are allowable under the Kern County Map Code 8.5 designation, except that the minimum parcel size for lands subject to Williamson Act or farmland security zone contracts is 80 acres. Approximately 521 acres of the study area are subject to the Kern County Map Code 8.5/20-acre minimum designation, and 1,555 acres are subject to the Kern County Map Code 8.5/80-acre minimum.

Kern County approved the Tejon Mountain Village Specific and Community Plan (TMV Specific Plan Area) covering approximately 26,417 acres and approving the TMV Project in the fall of 2009 (Kern County 2009a). The plan allows for the disturbance of 5,082 acres within the boundary of the TMV Specific Plan Area. In addition to the land use designations listed above, the following designations are also found in the TMV Specific Plan Area:

- Parks and Recreation Areas (Map Code 3.1). This category designates existing public and private recreation facilities and park areas. The purpose of this designation is to provide a wide variety of facilities to serve the many recreational interests of County residents. Permitted uses shall include, but are not limited to, public and private parks containing facilities for day use, hiking, camping, walking, picnicking, riding, and other recreational activities.
- 29 Dwelling Units/Net Acre Maximum (Map Code 5.1).This category is designed to allow high-density apartments and condominiums in proximity to an within walking distance of urban commercial centers, with a minimum of 1,502 square feet of site area per unit, yielding a maximum of 29 units per net acre.
- 10 Dwelling Units/Net Acre Maximum (Map Code 5.3). This category is designed to accommodate urban single-family development on lots with a minimum average size of 4,356 square feet (.10 of an acre), yielding a maximum of 10 units per net acre in conformance with precise development, cluster, or other special planning ordnance standards.
- 4 Dwelling Units/Net Acre Maximum (Map Cod 5.4). This category is designed to accommodate urban single-family development ton lots with a minimum average size of 0.25 net acre.
- 2 Dwelling Units/ Net Acre Maximum (Map Code 5.45). This category is designed to accommodate urban single-family development on lots with a minimum average size of 2 net acres.
- 1 Dwelling Unit/Net Acre Maximum (Map Code 5.5). This constitutes a single-family designation with rural service needs in the valley and desert regions, while in the mountain region, residential uses of this density will require urban service provision.
- Residential – Minimum 2.5 Gross Acres/Unit (Map Code 5.6). This constitutes a single-family designation with rural service needs in the valley and desert regions, while in the mountain region residential uses of this density will require urban service provision.
- General Commercial (Map Code 6.2). This constitutes retail and service facilities of less intensity than regional centers providing a broad range of goods and services which serve the day-to-day needs of nearby residents.
- Highway Commercial (Map Code 6.3). This constitutes uses that provide services, amenities, and accommodations at key locations along major roadways to visitors and through traffic.

Table 3.7-1 summarizes the acreage associated with each Kern County General Plan land use designation and corresponding map code in the study area.

Table 3.7-1. Land Use Designation and Map Code Acreage in the Study Area

Map Code	Land Use Designation	Acres
1.1	State or Federal Land	178
3.3	Other Facilities	1
4.1	Accepted County Plan Area	342
4.3	Specific Plan Required	6,623
5.7	Residential–Minimum 5 Gross Acres/ Unit	38
8.2	Resource Reserve [1]	817
8.3	Extensive Agriculture [2]	96,781
8.4	Mineral and Petroleum	8,585
8.5	Resource Management [3]	2,105
TMV Specific Plan Area		
3.3	Other Facilities	11
5.3	10 Dwelling Units/Net Acre Maximum	75
5.4	4 Dwelling Units/Net Acre Maximum	2,607
5.45	2 Dwelling Units/ Net Acre Maximum	43
5.5	1 Dwelling Unit/Net Acre Maximum	4,450
5.6	Residential – Minimum 2.5 Gross Acres/Unit	399
5.7	Residential–Minimum 5 Gross Acres/ Unit	731
8.5	Resource Management	15,132
5.1/6.3/3.1/3.3	Highway Commercial/Mixed	281
5.3/6.2/3.1	General Commercial/Mixed	2,686
	TOTAL	**141,886**

Notes:

[1]Approximately 751 acres are subject to Williamson Act contracts

[2]Approximately 53,000 acres are subject to Williamson Act contracts

[3] Approximately 1,598 acres are subject to Williamson Act contracts

Source: Kern County 2009b

3.7.2 Land Resources

Land resources in the study area consist of agricultural resources and mineral resources.

3.7.2.1 Agricultural Resources

Agricultural resources in the state of California are inventoried and ranked by the California Department of Conservation, in consultation with the U.S. Department of Food and Agriculture Natural Resource Conservation Service. Together, these agencies administer the Farmland Mapping and Monitoring Program (FMMP). The FMMP compiles *important farmland* maps on a biannual basis for each County in California. The maps use several categories to describe the farming potential of each mapped area within a County. In order of decreasing farming value, these categories include Prime Farmland, Unique Farmland, Farmland of Statewide Importance, Farmland of Local

Importance, Interim Farmland (irrigated and nonirrigated farmland), Grazing Land, Urban and Built-up Land, and Other Lands.

FMMP designations in the study area are shown in Figure 3.7-2. There are no areas of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance in the study area. Approximately 100 acres of the study area located near Castac Lake have been mapped as Interim Farmland (irrigated). No commercial agriculture occurs in the study area. The majority of the study area is classified as Grazing Land. Higher elevation areas are classified as Other Lands because they do not meet the criteria of any other FMMP category.

Certain portions of the study area are protected under agricultural conservation agreements related to the California Land Conservation Act, also known as the Williamson Act (Figure 3.7-3). These agreements reduce the tax basis of the affected property in exchange for the owner's commitment to maintain agricultural or grazing activities for a minimum period of 10 years. The contract term automatically renews every year for a new 10-year period until the owner elects to terminate the agreement pursuant to the act. In such an event, the agreement will expire 10 years after a notice of nonrenewal has been properly filed in accordance with the act. Nonrenewal notices affecting approximately 8,000 acres of the study area generally located in or near the eastern boundaries of the TMV Planning Area were filed by TRC in 2001 and 2003.

3.7.2.2 Mineral Resources

There are two mines in the study area: the La Liebre mine, which is an approximately 200-acrea sand, rock, and gravel mine; and the National Cement mine, which is an approximately 2,500-acre aggregate and Portland cement mine (California Department of Conservation 2007). Both of these mines operate under the terms of mineral extraction leases with TRC (Figure 3.7-4).

Approximately 3,384 acres of the study area have been mapped as mineral resource zones by the state of California under the Surface Mining and Reclamation Act. These include MRZ-2 areas, which are known to contain mineral resources, and MRZ-3 areas, where the significance of the mineral resources present has not been determined. These areas are primarily located near the southwestern border of the study area and, as shown on Figure 3.7-4, overlap with the existing mines discussed above.

3.7.3 Socioeconomic Conditions

This section describes the current population, demographics, economic conditions, and environmental justice conditions in the study area. As of June 2011, more detailed 2010 Census data had not been published by the U.S. Census Bureau. Therefore, information in this section is based largely on the 2000 Census.

3.7.3.1 Population

The study area is located near the southern edge of Kern County and north of Los Angeles County. A portion of the study area is located near State Route (SR) 58. Except in the immediate vicinity of the ranch headquarters (which includes Fort Tejon Elementary School and some residences near I-5), there is no resident population in the study area.

The communities of Lebec, Frazier Park, and Lake of the Woods have been designated as Census Designated Places by the U.S. Census Bureau and are located to the west of the study area. The portion of the study area adjacent to SR 58 is near two additional Census Designated Places, Bear Valley Springs and Keene.

Kern County encompasses 8,202 square miles, and is the third largest County in California, located at the southern end of the Central Valley. From 2000 to 2010, the population in Kern County grew by 26.9% to 839,631 (U.S Census Bureau 2011a). Of the areas in or near the study area, only Keene had a larger growth rate of 27.1% from 2000 to 2010, due to a rise in population from 339 to 431. Bear Valley Springs grew by 22.2% to 5,172; Frazier Park grew by 14.6% to 2,691; Lake of the Woods grew by 10.1% to 917; and Lebec grew by 14.2% to 1,468; according to California Department of Finance projections, the County's population is anticipated to grow to 1,086,113 persons by 2020 and 1,352,627 persons by 2030 (California Department of Finance 2011a).

3.7.3.2 Housing

Kern County has experienced significant housing growth since 2000. The supply of residential units increased by 22.8% between 2000 and 2010, from 231,564 units to 284,367 units (California Department of Finance 2011b). During this period, the largest increase in housing in the study area occurred in Keene and Bear Valley Springs, which both grew by 27%. Keene grew from 177 units to 225 housing units, and Bear Valley Springs grew from 2,147 to 2,729 units. Between 2000 and 2010, housing units grew from 516 to 594 in Lebec, from 203 to 354 units in Frazier Park, and from 475 to 480 units in Lake of the Woods, representing increases of 15%, 12%, and 1%, respectively (California Department of Finance 2011c).

3.7.3.3 Demographics

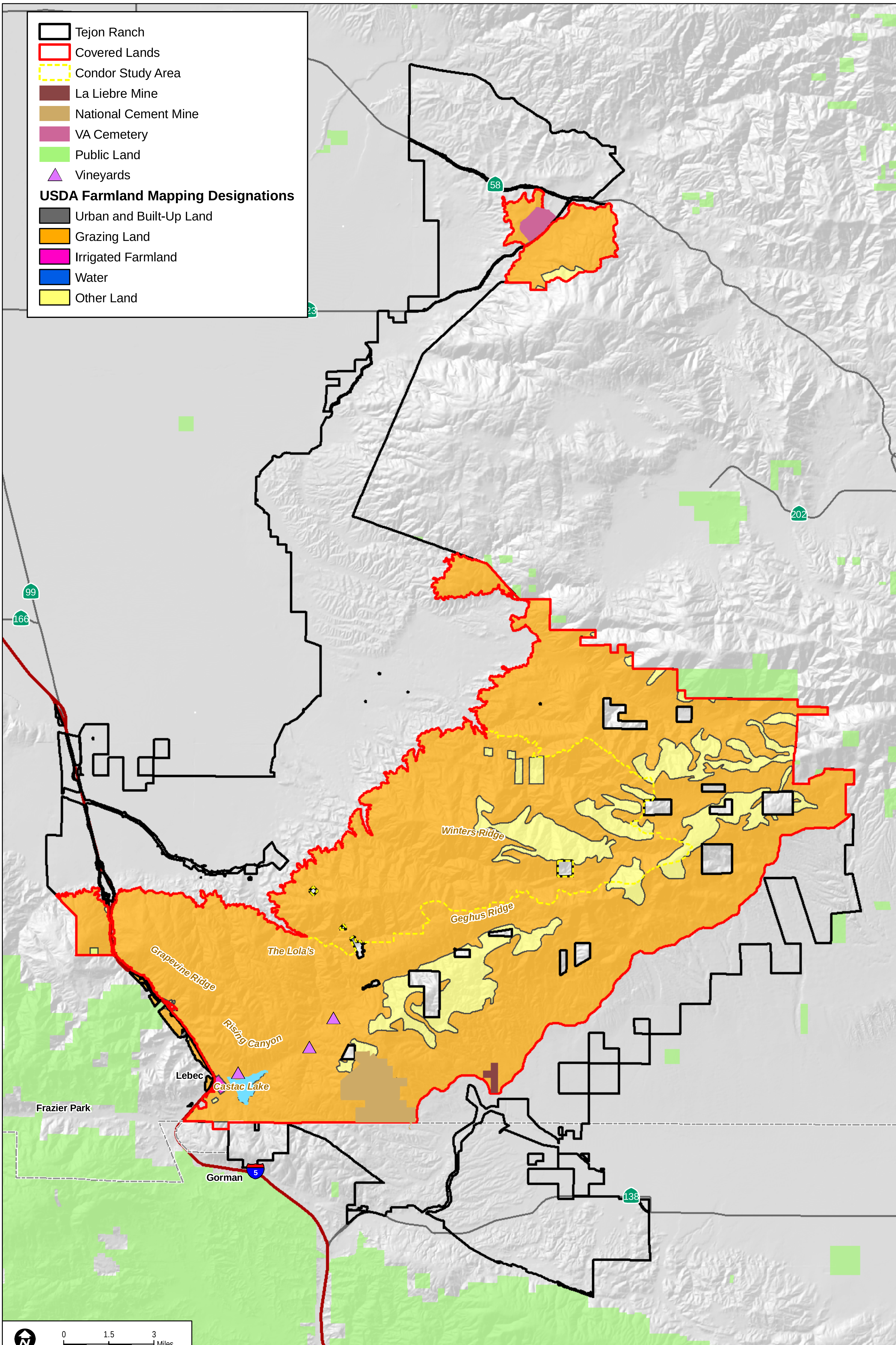
Race and Hispanic Origin

Table 3.7-2 lists the race and Hispanic origin for Kern County as a whole and for the Census Designated Places that occur near the study area (U.S. Census Bureau 2011b).

Table 3.7-2. Race and Hispanic Origin by Percentage

Jurisdiction	Total 2010 Population	White	Black or African American	American Indian & Alaska Native	Asian	Native Hawaiian & Other Pacific Islander	Some Other Race	Two or More Races	Hispanic Origin
Kern County	839,631	38.6%	5.4%	0.7%	3.9%	0.1%	0.2%	1.9%	49.2%
Bear Valley Springs	45,172	87.0%	1.4%	0.7%	1.0%	0.1%	0.1%	1.9%	7.7%
Frazier Park	2,691	76.1%	0.5%	0.6%	0.8%	0.1%	0.1%	2.2%	19.6%
Lebec	1,468	67.7%	0.5%	1.2%	1.2%	0.0%	0.0%	2.5%	26.9%
Keene	431	84.0%	0.5%	0.5%	1.9%	0.0%	0.2%	2.1%	10.9%
Lake of the Woods	917	82.1%	0.3%	1.6%	1.2%	0.0%	0.0%	1.3%	13.4%

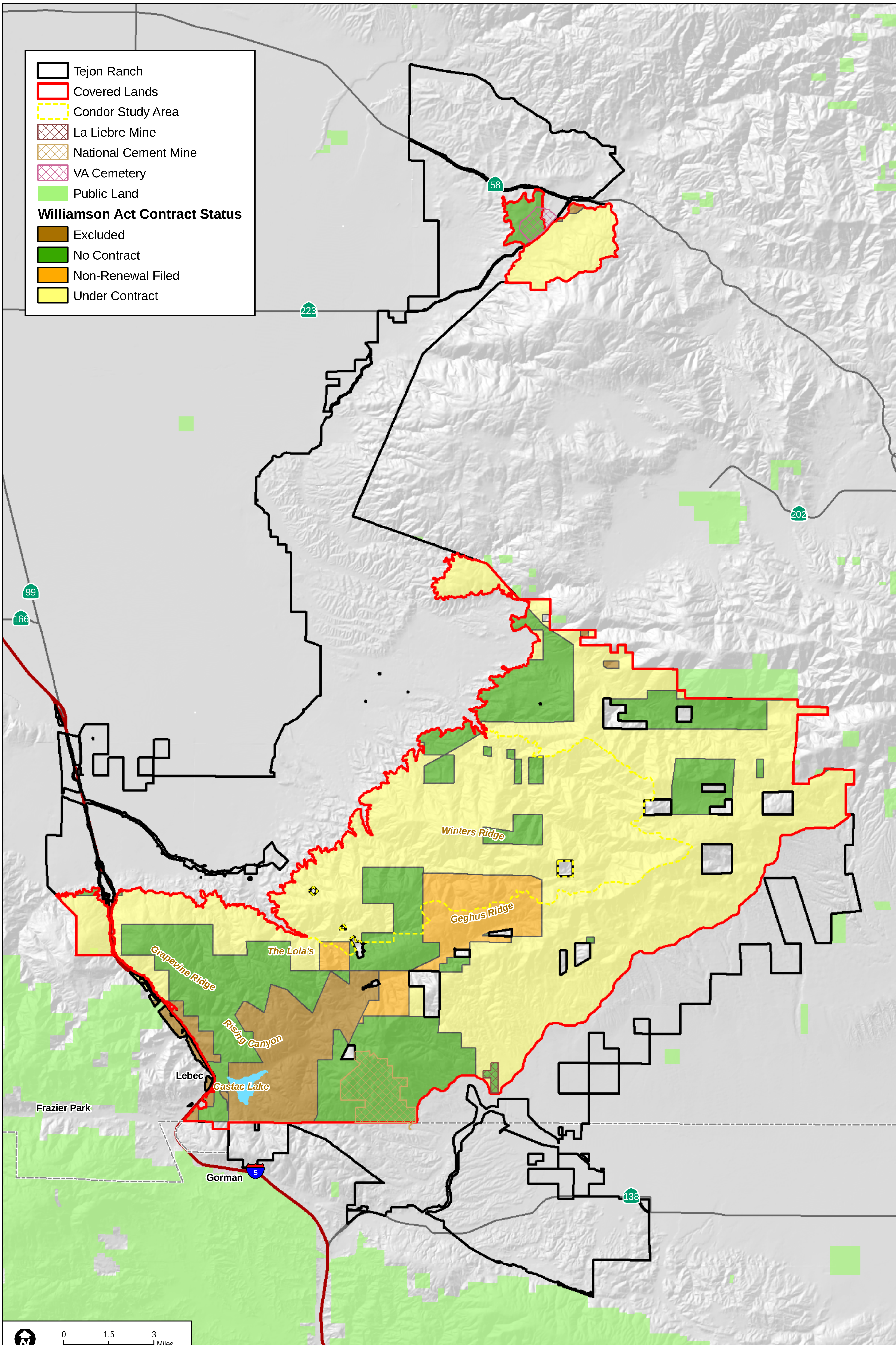
Source: California Department of Finance 2011d



SOURCE: California Department of Conservation 2004

FIGURE 3.7-2

USDA Farmland Mapping Designations in Covered Lands



SOURCE: California Department of Conservation 2008

FIGURE 3.7-3

Williamson Act Contract Areas in Covered Lands

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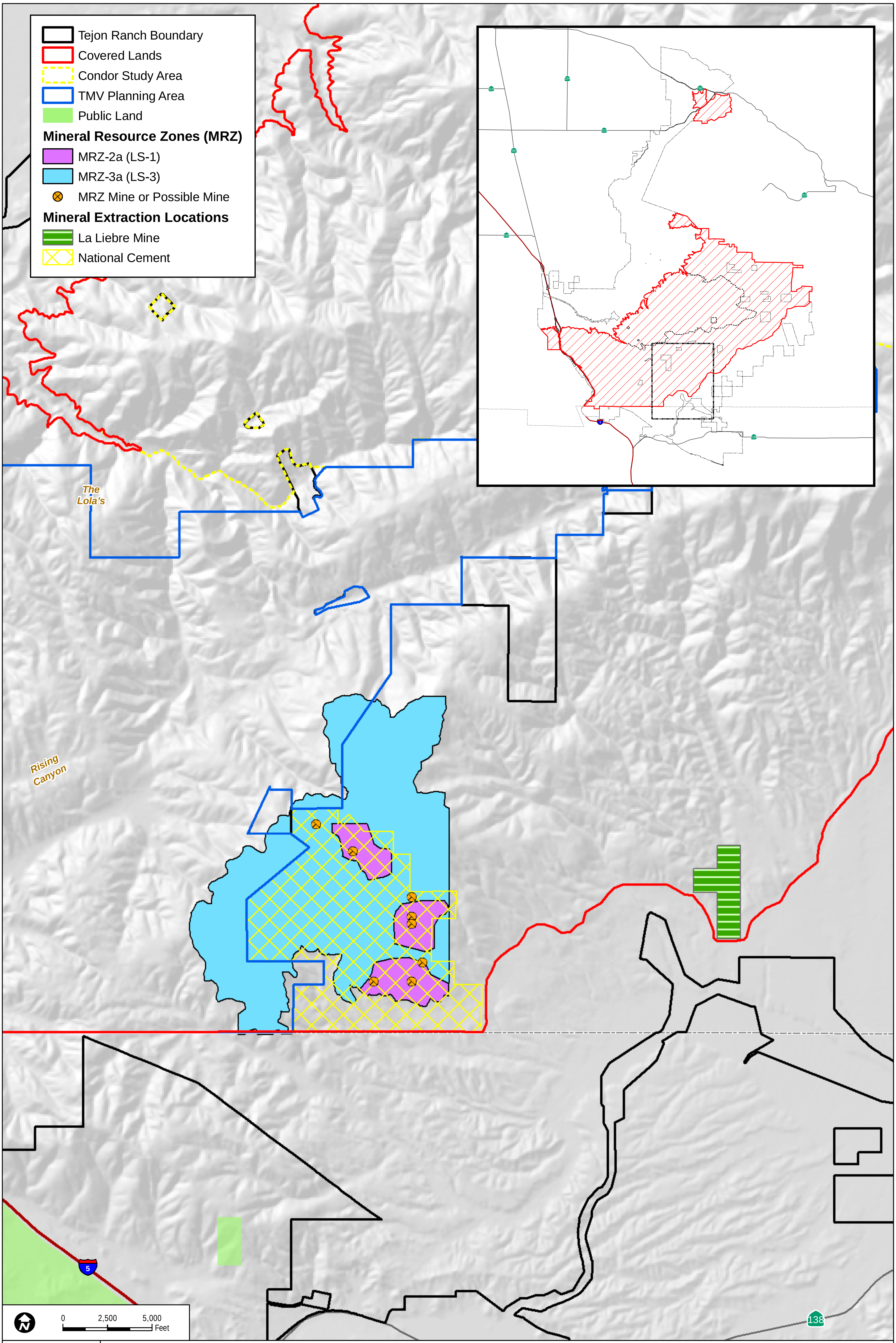


SOURCE: TRC 2007
USGS 2007

FIGURE 3.7-4

Mineral Resource Zones and Mining Leases in Covered Lands

Labor Force and Unemployment Rates

The number of people considered to be in the labor force (i.e., actively working or seeking work) and the unemployment rate for Kern County and the cities and Census Designated Places near the study area are shown in Table 3.7-3 for the period from 2000 to 2010.

Table 3.7-3. Labor Force and Unemployment Rates

	Kern County	Bear Valley Springs	Frazier Park	Keene	Lake of the Woods	Lebec
2000 Labor Force	293,500	1,900	1,000	100	400	600
2000 Unemployment Rate (%)	8.2	2.2	7.2	1.6	3.7	3.6
2001 Labor Force	298,000	1,900	1,000	100	400	600
2001 Unemployment Rate (%)	8.6	2.3	6.9	1.7	3.8	3.7
2002 Labor Force	307,100	2,000	1,000	100	400	600
2002 Unemployment Rate (%)	9.8	2.6	8.5	2.0	4.4	4.3
2003 Labor Force	313,700	2,000	1,000	100	400	600
2003 Unemployment Rate (%)	10.3	2.8	9.0	2.1	4.7	4.5
2004 Labor Force	317,200	2,100	1,100	100	400	600
2004 Unemployment Rate (%)	9.9	2.6	8.6	2.0	4.5	4.3
2005 Labor Force	330,400	2,100	1,100	100	400	700
2005 Unemployment Rate (%)	8.4	2.2	7.3	1.7	3.8	3.7
2006 Labor Force	341,600	2,200	1,200	100	400	700
2006 Unemployment Rate (%)	7.6	2.0	6.6	1.5	3.4	3.3
2007 Labor Force	351,900	2,200	1,200	100	400	700
2007 Unemployment Rate (%)	8.3	2.2	7.2	1.6	3.7	3.6
2008 Labor Force	359,300	2,300	1,200	100	500	800
2008 Unemployment Rate (%)	9.7	2.4	8.5	0.0	4.8	4.5
2009 Labor Force	363,100	2,200	1,200	100	400	700
2009 Unemployment Rate (%)	14.4	3.7	12.6	0.0	7.6	6.7
2010 Labor Force	368,500	2,200	1,200	100	500	800
2010 Unemployment Rate (%)	15.9	4.2	14.0	0.0	8.4	7.6
2011 Labor Force	361,200	2,200	1,200	100	400	700
2011 Unemployment Rate (%)	16.0	4.2	14.2	0.0	8.4	7.6

Source: California Employment Development Department 2011a, 2011b

Income and Poverty Levels

Income[1] levels for individuals and families[2] in 2000 are shown in Table 3.7-4 (U.S. Census Bureau 2000a). The highest median family incomes in 2000 are in Bear Valley Springs ($64,583) and Keene ($59,583). The highest per capita incomes are also in Bear Valley Springs ($27,388) and Keene ($27,986). The lowest median family incomes are in Kern County as a whole ($39,403); the area with the lowest per capita income level was Lebec ($14,895).

Table 3.7-4. Family and Individual Income and Poverty Levels

Jurisdiction	Median Family Income	Per Capita Income	Families Below Poverty Level	Individuals Below Poverty Level
Kern County	$39,403	$15,760	16.8%	20.8%
Bear Valley Springs	$64,583	$27,388	5.4%	7.2%
Frazier Park	$46,857	$19,302	11.0%	12.4%
Keene[1]	$59,583	$27,986	22.5%	24.7%
Lake of the Woods	$43,468	$17,983	13.2%	14.2%
Lebec	$40,972	$14,895	1.4%	8.1%

Note:

[1] Keene has both the highest per capita income level of the areas discussed in this analysis and the highest poverty rate. This is due to the presence in this very small community (89 families) of 16 families making over $100,000 a year and 20 families making below the poverty level. These extremes, combined with the small size of the community, produce these results.

Sources: U.S. Census Bureau 2000a through 2000g

The U.S. Census Bureau has identified income thresholds that vary by family size and composition to define the applicable poverty level within a population (U.S. Census Bureau 2000h). Under these thresholds, in 2000, approximately 22.5% of all families and approximately 24.7% of all individuals were below the poverty level in Keene, representing the highest poverty rates in the areas near the study area. Family and individual poverty rates in all of Kern County were substantially below these levels, and lower in each of the other Census Designated Places near the study area.

3.7.4 Hazardous Materials and Other Hazards

3.7.4.1 Hazardous Materials

As discussed above, the majority of the study area is undeveloped and not subject to significant hazardous material risks. However, there are some known hazardous materials sites located in the study area, including but not limited to, the California Highway Patrol Facility located at 4459 Lebec Road and the old Post Office located at 1777 Lebec Road (Kern County 2009c, pp. 4.7-5 to 4.7-8). In addition, the National Cement mine has been the subject of ongoing solvent-related cleanup and

[1] Total income is the sum of the amounts reported separately for wages, salary, commissions, bonuses, or tips; self-employment income from own nonfarm or farm businesses, including proprietorships and partnerships; interest, dividends, net rental income, royalty income, or income from estates and trusts; social security or railroad retirement income; supplemental security income; any public assistance or welfare payments from the state or local welfare office; retirement, survivor, or disability pensions; and any other sources of income received regularly, such as veterans' payments, unemployment compensation, child support, or alimony.

[2] A family is a group of two or more people who reside together and who are related by birth, marriage, or adoption.

abatement orders by the Regional Water Quality Control Board and the Department of Toxic Substances Control. Land uses in or near the study area that may be associated with the use of hazardous wastes or materials include the following:

- Agricultural activities that used chemicals that are now prohibited due to human health risks and that may persist in the environment.
- Utilities that contain natural gas or oil in underground pipelines.
- Electrical transformers that used polychlorinated biphenyls (PCBs).
- Past hunting that included use of lead shot or bullets prior to the TRC and state ban on lead ammunition in early 2008.
- Highways, including I-5, SR 58, and SR 223, that could have airborne lead derived from the use of leaded gasoline, lead tire weights, lead in paint, ambient levels of lead in gasoline, and tire wear.
- Industrial or public safety facilities, such as the Caltrans Maintenance Yard, the California Highway Patrol facilities, and past and present service stations that may use or have used aboveground or underground storage tanks.
- Existing and closed landfills in the vicinity of Lebec.
- The National Cement and La Liebre mines.

3.7.4.2 Electromagnetic Fields

Electromagnetic fields are generated by transmission lines and electrical appliances, which exist throughout Kern County and particularly in urban areas. Several major transmission lines cross the study area and generate localized electromagnetic fields. These fields are generated by electricity use and the flow of electrons through power lines and electrical appliances. Although concern about the health effects of electromagnetic fields has increased over the past 20 years, studies to date have failed to show that exposure to electromagnetic fields cause adverse health effects. Certain animal and cell studies suggest that biological changes can be associated with magnetic fields, but as yet there is no accepted method for analyzing how these findings may affect human health. Some epidemiological studies have shown an association between leukemia and an indirect estimate of high magnetic field exposure, such as for populations that have lived very close to major transmission lines. These studies remain inconclusive.

3.7.4.3 Wildfires

Wildfires can occur throughout Kern County, particularly where there are expanses of open space. In the study area, wildfires occur due to the presence of combustible vegetation, rugged terrain, and hot or dry weather patterns conducive to fire propagation and spread. The study area is subject to unique wind and weather patterns based on geographic location at the southern extent of the San Joaquin Valley, and at the convergence of the Sierra Nevada, the Tehachapi Mountains, and the Coast Range. Typical wind patterns in the region include easterly winds in the morning hours, shifting to westerly winds in the afternoon. In the northern portion of the study area, north/northwest winds typically flow up from the San Joaquin Valley. Localized wind patterns are strongly affected by both regional and local topography.

Fire perimeter data and records of fire occurrences in California are maintained by the California Department of Forestry and Fire Protection via their Fire and Resource Assessment Program (FRAP) historic fire perimeter data set. Based on an evaluation of FRAP fire history, 42 fires burned in or onto the study area between 1912 and 2010. The most recent fires occurred in August of 2010. The Post Fire and Base Fire were small fires (1,300 and 70 total acres, respectively) burning along the western edge of the study area adjacent to I-5. Fire occurrence in the study area is concentrated primarily along the western boundary, adjacent to I-5, and fires in this area are generally small in total size (less than 1,000 acres). Historically, fires burning in or onto the remaining portions of the study area (east of I-5) tend to be larger in overall size, but are isolated geographically. Specifically, five large fires burned in or onto the study area between 1986 and 2006, including the 1986 Los Alamos Fire (12,140 total acres), the 1990 Tejon Fire (7,800 total acres), the 1992 Middle Ridge Fire (7,400 total acres), the 1996 White Oak Fire (7,180 total acres), and the 2006 Quail Fire (4,770 total acres). With the exception of the Quail Fire and the Los Alamos Fire, both of which burned in the western portion of the study area near I-5, these larger fires were separated by distances of up to 4.5 miles.

Wildfire has played a role in shaping and maintaining the plant communities found in the study area; however, its effect has been minimized because of vegetation alterations resulting from livestock grazing practices. Further, the small amount of human activity in the study area minimizes potential wildfire ignition sources. Ignition sources for wildfires burning in the study area are typically associated with transportation corridors, namely I-5, where overheated vehicles and discarded cigarettes have been identified as ignition sources for 11 of the 42 fires burning in or onto the study area (26%) (California Department of Forestry and Fire Protection 2007).

3.7.4.4 Disease Vectors

Disease vectors associated with insects, rodents, and fungi are relatively high in Kern County. The most common vector-caused diseases in Kern County include the following:

- **West Nile Virus.** West Nile virus is a mosquito-borne disease that, in rare situations, can result in permanent neurological effects or death. Approximately 80% of infected people have no symptoms. Fifteen cases were reported in Kern County in 2010. Sentinels, such as chickens and horses, are also very susceptible, with 86 reported cases in 2010 (Center for Disease Control and Prevention 2011).
- **Plague.** Plague is a bacterial infection carried by fleas on ground squirrels and other rodents. Plague is also transmitted to humans by pets that may become infested with fleas. The disease is potentially fatal unless antibiotic therapy is given. There were no reported cases of plague in Kern County in 2010 (California Vectorborne Disease Surveillance System 2010).
- **Lyme Disease.** Lyme disease is a bacterial infection carried by the western black-legged tick in California. Symptoms include rashes, fatigue, and muscle and joint pain. On average, two cases are reported in Kern County each year. Lyme disease can also affect dogs, horses, and other domesticated animals (California Department of Public Health 2010).
- **Hantavirus Pulmonary Syndrome.** Hantavirus is a respiratory disease carried by wild rodents, especially deer mice. About 50% of human cases are fatal. Since first discovered in 1993, four cases with probable exposure in Kern County have occurred (California Department of Public Health 2007).
- **San Joaquin Valley Fever.** Valley fever disease is caused by fungus spores carried in soil or blowing dust, primarily in arid regions. Agricultural and construction workers are most often infected, but windy weather can carry spores into moister, urban areas. Many people experience mild symptoms and then become immune to further infection (California Health and Human Services Agency 2008).
- **Other Vector-Borne Illnesses.** Other vector-borne illnesses that may occur in the study area as temperatures warm with global warming and their ranges are extended into higher latitude areas include malaria, tick-borne encephalitis, yellow fever, and dengue fever (Harvell et al. 2002).

3.7.5 Public Services and Utilities

3.7.5.1 Fire and Emergency Response

The Kern County Fire Department is responsible for providing fire protection as the primary responder in the unincorporated areas of Kern County. These include the study area as well as regional transportation corridors such as I-5 and SR 223. The Kern County Fire Department staffs 46 fire stations. The department is divided into seven battalions for operations management (Kern County Fire Department 2011). The nearest station to the study area is Station 56 in Lebec, located at 1548 Golden State Highway, adjacent to I-5. Kern County stations at the Tejon Ranch Commerce Center and Frazier Park, and the Los Angeles County station in Gorman to the south, can also provide emergency fire services to the study area. The Bear Valley station at 28946 Bear Valley Road in Tehachapi is located nearest to the portions of the study area adjacent to SR 58. Kern County stations at Arvin and Stallion Springs can also serve the area (Figure 3.7-5).

3.7.5.2 Police Protection

The Kern County Sheriff's Department and the California Highway Patrol are responsible for law enforcement in the study area. The sheriff's department provides primary police protection for unincorporated portions of Kern County. The California Highway Patrol provides traffic regulation enforcement, emergency incident management, and service and assistance on I-5 and other major roadways in California. The main sheriff's station is in Bakersfield. Fourteen sheriff substations are located throughout the County. The nearest substation to the study area is the Frazier Park Substation, located at 617 Monterey Trail. Near SR 58, substations are located in Tehachapi (Golden Hills), at 22209 Old Town Road, and in Lamont, at 12022 Main Street. The nearest California Highway Patrol station is the Fort Tejon Station, located at 1033 Lebec Road in Lebec. The California Highway Patrol Grapevine Inspection Facility is also located along I-5 north of the study area, at 32829 I-5 in Lebec (Figure 3.7-5).

3.7.5.3 Schools

There are three school districts in the vicinity of the study area: the El Tejon Unified School District, which provides kindergarten through 12th grade education; the Arvin Union School District, which provides kindergarten through 8th grade education; and the Kern High School District, which provides education for grades 9 through 12. Other nearby schools include Frazier Park School, Frazier Mountain High School, Sierra Vista Elementary School, Bear Mountain Elementary School, Haven Drive Middle School, and Arvin High School.

3.7.5.4 Water Supply

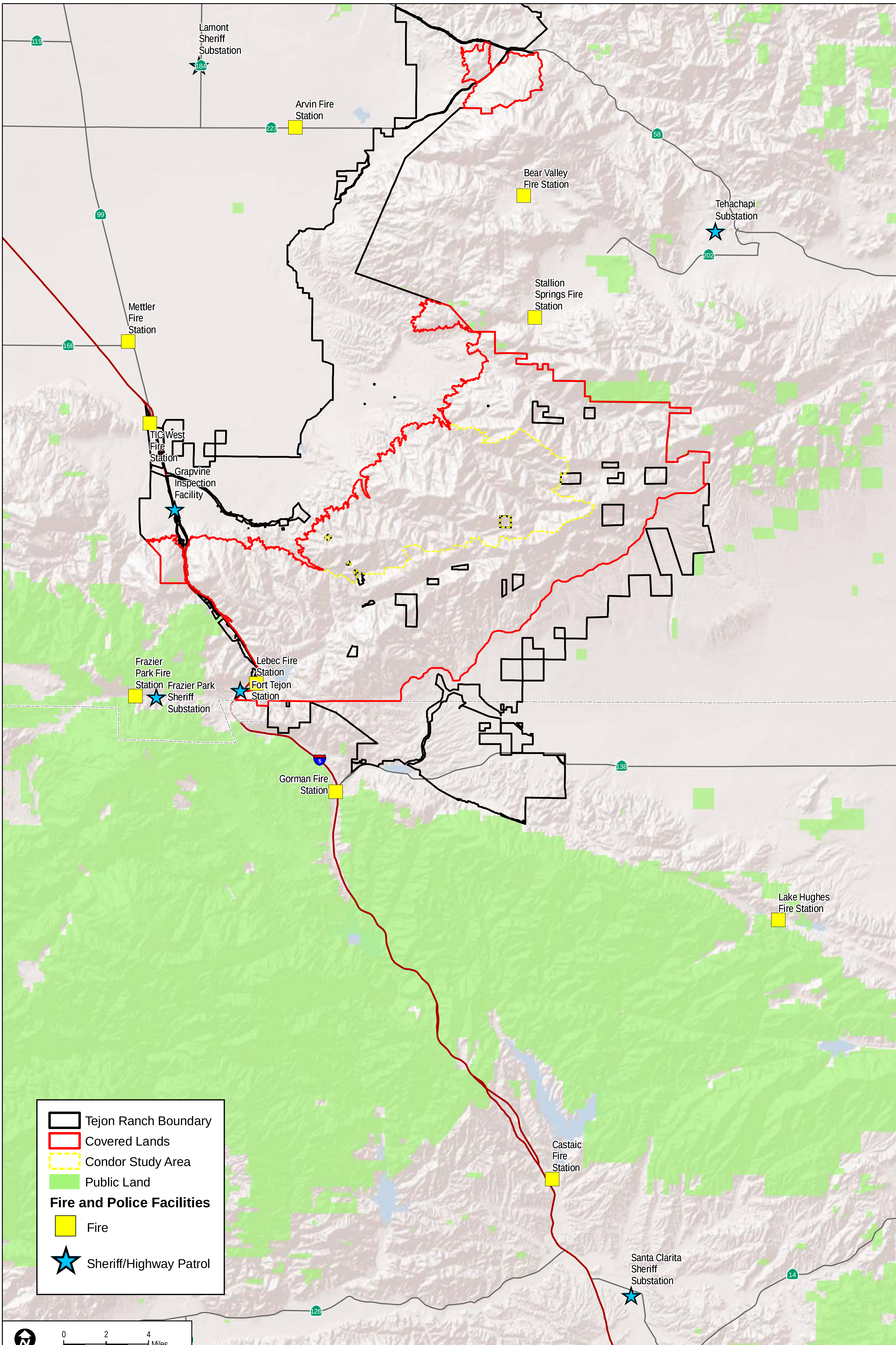
Portions of the study area are located within the existing service areas of three water districts: TCWD, the Tehachapi-Cummings County Water District, and the Antelope Valley–East Kern Water Agency, as shown in Figure 3.7-6. The TCWD service area includes a portion of the TMV Planning Area, and TCWD would provide water and wastewater collection and treatment services for the TMV Project. Tehachapi-Cummings County Water District and the Antelope Valley–East Kern Water Agency do not currently provide water or other services to the study area, nor do they have plans to do so. Well water near Castac Lake is used by TRC for ranch headquarters, landscaping irrigation, and lake management purposes, as well as for limited agricultural irrigation, El Tejon School and Tejon Fields landscaping. Approximately two homes receive well water near SR 58 in the study area.

3.7.5.5 Utilities

A number of public and private utilities traverse the study area. These utilities include the California Aqueduct, various underground fiber-optic systems, telephone lines, natural gas and oil pipelines, electrical transmission lines, high-tension power lines, and wireless facilities. Figure 3.7-1 depicts utility corridors and facilities.

3.7.5.6 Other Services

The nearest public libraries to the study area are located in Frazier Park, Arvin, and Tehachapi. The nearest hospitals are located in Tehachapi and the City of Bakersfield. Kern County government facilities are located primarily in Bakersfield.



SOURCE: TRC 2007

FIGURE 3.7-5

Fire and Police Protection Facilities

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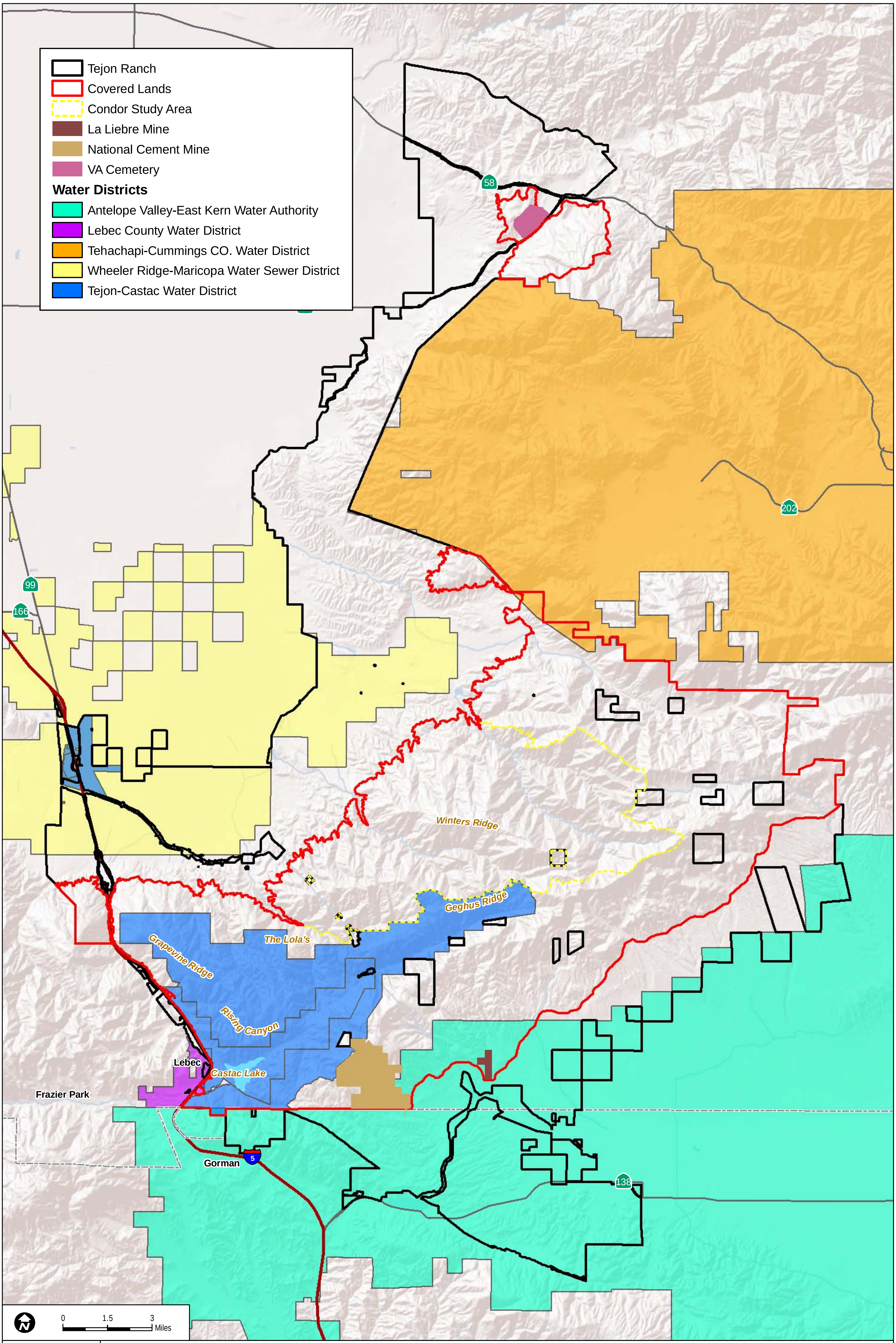

SOURCE: TRC 2007
California Department of Water Resources 2003

FIGURE 3.7-6
Water Districts

3.8 Transportation

This section describes the existing transportation systems in the study area, including major roadways, modes of public transportation, and air travel. For this section, the study area includes the Covered Lands and the surrounding roadways used to reach the Covered Lands. The study area is divided into northern and southern regions. The northern region is in Kern County and the southern region is in the northwest part of Los Angeles County.

3.8.1 Major Roadways

The study area is encircled by a network of Federal and state highways. Access to the Covered Lands from the south is provided by Interstate 5 (I-5), which runs north-south along the southwestern edge of the Covered Lands, and by State Route (SR) 138, which runs east-west to the south of the Covered Lands. Access from the north is provided by SR 223 and SR 58, which are located several miles to the north and transect the Covered Lands near the Veteran's Administration cemetery site. SR 138 runs east-west, generally parallel to, but several miles south of, the southern portion of the Covered Lands. Access from the east is provided by SR 58 and SR 14, which runs north-south, far to the east of the Covered Lands, and connects SR 58 with SR 138. Major roadways are identified on Figure 3.6-1.

There is no public access in most of the Covered Lands except along public roadways adjacent to and including I-5 from approximately the Lebec Road interchange to the Fort Tejon interchange and along SR 223. Private access to the interior of the Covered Lands primarily occurs at three locations:

- DWR Road, which runs from the Lebec Road/I-5 interchange and connects with a private paved road that extends up to the southern end of Bear Trap Canyon and then runs north to the California Aqueduct facilities on the valley floor at Edmonston Pumping Plant Road.
- Unpaved turnoffs located along SR 223 that access the far northern portion of the Covered Lands.
- A paved, private mining road extending from SR 138 to the National Cement facility on the southern face of the Tehachapi Mountains

All other roadways in the interior are unpaved, private, and maintained by Tejon Ranchcorp (TRC).

The tables in this section provide the most recent traffic counts available (2009) for the primary access routes identified above. The traffic counts are generated by the California Department of Transportation (Caltrans) and reported in terms of:

- annual average daily traffic (AADT) counted at a specific location, such as an interchange or an intersection along a roadway;
- the peak hour traffic at the same location; and
- the peak month average daily traffic (ADT) at the same location.

The AADT represents the total volume of traffic measured (or extrapolated) at a location between October 1 and September 30 of each year, divided by 365. The peak hour is the highest level of traffic recorded for a single hour at a location, generally during weekday work commutes in urban and suburban areas. The peak month ADT represents the ADT of the month in which the heaviest traffic flow occurs at a location (California Department of Transportation Traffic and Vehicle Data Systems Unit 2010).[1]

3.8.1.1 Interstate 5

I-5 is the main north-south interstate highway on the west coast passing through California, Oregon, and Washington between Canada and Mexico. South of the intersection with SR 99 the highway consists of four mixed-flow lanes in each direction. As I-5 parallels the southern boundary of the Covered Lands, it rises sharply from the San Joaquin Valley floor, eventually reaching Tejon Pass. In the vicinity of the study area, I-5 is primarily used for short and long-haul semitruck trips and weekend and holiday leisure travel, with peaks during popular travel periods. Traffic on I-5 is typically in a free-flow condition.

Table 3.8-1 presents the 2009 traffic counts for I-5 at the Caltrans monitoring locations from Quail Lake Road, south of the Covered Lands in Los Angeles County, to the intersection with SR 223 to the north.

Table 3.8-1. 2009 Caltrans I-5 Traffic Counts (number of vehicles)

Off-Ramp or Intersection Location	South Peak Hour	South Peak Month	South AADT	North Peak Hour	North Peak Month	North AADT
Los Angeles County						
Quail Lake Road IC	9,100	78,000	68,000	9,200	78,000	68,000
North Jct. SR 138, SR 138 IC	9,200	78,000	68,000	9,700	82,000	71,000
Gorman Road IC	9,700	82,000	71,000	9,700	81,000	70,000
Los Angeles/Kern County Line	9,400	80,000	69,000			
Kern County						
Los Angeles/Kern County Line				9,400	80,000	69,000
Frazier Mountain Park Road IC	9,700	81,000	70,000	9,400	80,000	69,000
Lebec Road IC	7,700	75,000	69,000	7,700	75,000	69,000
Fort Tejon/Digier Roads IC	7,700	75,000	69,000	7,700	75,000	69,000
Junction of Route 166	4,500	35,000	28,500	4,700	35,500	29,500
Old River Road IC	4,700	35,500	29,500	4,300	36,000	29,800
Junction of SR 223	4,300	36,000	29,000	4,700	41,500	30,000

Notes: IC = Interchange, AADT = annual average daily traffic, SR = State Route
Source: California Department of Transportation 2010.

[1] Caltrans also reports traffic counts in terms of back and ahead flows. *Back* generally means southern or western flows, depending on the designated direction of the applicable roadway. *Ahead* means northern or eastern flows. For ease of reference, the tables identify the actual directional flow of the traffic counts, rather than use the back or ahead nomenclature.

In 2001, Kern County approved the Frazier Park/Lebec Specific Plan for the mountain communities located west of the study area. The plan covers approximately 150 acres of the Covered Lands. The circulation element addresses the condition and desired future capacity of the local roadway system that accesses I-5. Based on late 1990 traffic information, the Frazier Park/Lebec Specific Plan states that buildout of the plan area would result in additional traffic at I-5 intersections and adjoining roads that would fall below acceptable level of service (LOS)[2] goals without mitigation. To address these concerns, the plan provides that:

> Any future project which will add substantial traffic in the Plan Area, defined as a "project" generating in excess of fifty (50) peak hour trips or ten (10) peak hour trips through the intersection of Frazier Mountain Park Road and Lebec Road, or Frazier Mountain Park Road and an off-ramp of Interstate 5, or as determined by Kern County Roads Department, shall conduct a traffic study identifying appropriate mitigations, if any, to maintain a Level Of Service D (LOS D) at the intersection of Lebec Road, Frazier Mountain Park Road and its related frontage road, or LOS C for Interstate 5 off-ramps (Kern County 2003: 6-6).

3.8.1.2 State Route 138

SR 138 is an east-west state highway extending east from I-5 south of the community of Gorman. Near the Covered Lands, SR 138 is a two-lane highway providing access to the cities of Lancaster and Palmdale. The highway serves numerous rural high desert communities and also serves as a connection between Interstates 5 and 15. As the highway passes to the south of the Covered Lands it operates generally in a free-flow condition but can experience operating constraints given two-lane highway conditions.

Table 3.8-2 presents the 2009 traffic counts for SR 138 at the California Department of Transportation (Caltrans) monitoring locations between I-5 and SR 14.

Table 3.8-2. 2009 Caltrans SR 138 Traffic Counts (number of vehicles)

Off-Ramp or Intersection Location	West Peak Hour	West Peak Month	West AADT	East Peak Hour	East Peak Month	East AADT
Los Angeles County						
Jct. I-5, Golden State Freeway IC				250	1,900	1,800
Gorman Post Road	500	3,800	3,600	510	4,700	44,00
Old Ridge Route Road	510	4,700	4,400	440	4,050	3,850
245th Street West	410	4,150	3,900	390	4,000	3,750
110th Street West	480	2,900	2,850	500	3,050	2,950
Junction of SR 14 North, Antelope Valley Freeway	640	3,850	3,750	2,750	33,000	31,500

Notes: IC = Interchange, AADT = annual average daily traffic, SR = State Route
Source: California Department of Transportation 2010

[2] Level of service (LOS) refers to the condition of traffic flow along a roadway or at an intersection relative to certain performance standards generally described in the Highway Capacity Manual published by the Transportation Research Board of the National Research Council. The applicable LOS is generally analyzed on an A to F scale, with LOS A representing highest level of performance and LOS F the lowest level of performance.

3.8.1.3 State Route 223

SR 223 is located in Kern County and is a two-lane highway connecting I-5 and SR 58. Situated north of the Covered Lands, SR 223 passes through the City of Arvin and agricultural land. Similar to SR 138, SR 223 operates in a free-flow condition but can experience operations constraints due to the two-lane configuration.

Table 3.8-3 presents the 2009 traffic counts for the northern portion of the study area along the SR 223 corridor at the Caltrans monitoring locations between I-5 and SR 58.

Table 3.8-3. 2009 Caltrans SR 223 Traffic Counts (number of vehicles)

Off-Ramp or Intersection Location	West Peak Hour	West Peak Month	West AADT	East Peak Hour	East Peak Month	East AADT
Kern County						
Old River Road	130	1,400	1,200	380	4,750	4,400
Wible Road	440	5,400	5,000	440	5,400	5,000
Junction of SR 99	410	5,100	4,700	570	7,500	6,900
Union Avenue	550	7,200	6,700	580	8,200	5,500
Junction of SR 184 North	540	7,100	6,600	580	7,600	7,000
Arvin, Comanche Drive	600	7,900	7,200	830	10,800	10,000
Arvin, A Street	840	10,800	10,000	800	10,500	9,600
Arvin, Derby Street (El Tejon Highway)	480	6,300	5,800	180	2,400	2,200
Tower Line Road	180	2,400	2,200	170	2,150	2,000
Arvin, East	170	2,150	2,000	170	2,050	1,550
Junction of SR 58	200	1,350	1,150			

Notes: AADT = annual average daily traffic, SR = State Route
Source: California Department of Transportation 2010

3.8.1.4 State Route 58

SR 58 is a four-lane east-west highway passing northwest of the Covered Lands through the Tehachapi Mountains as it links the Mojave Desert from a junction with Interstate 15 with the coast from a junction with US 101. SR 58 serves an important regional function as it passes through the Tehachapi Pass and connects the town of Tehachapi with the City of Bakersfield. Similar to other highways in the region, SR 58 typically operates under free-flow conditions but can experience some operating constraints due to grade and weather conditions.

Table 3.8-4 presents the 2009 traffic counts in the northern portion of the study area along SR 58 at the Caltrans monitoring locations between SR 178 in Bakersfield and the junction with SR 14.

Table 3.8-4. 2009 Caltrans SR 58 Traffic Counts (number of vehicles)

Off-Ramp or Intersection Location	West Peak Hour	West Peak Month	West AADT	East Peak Hour	East Peak Month	East AADT
Kern County						
Break in Route						
Bakersfield, Real Road	3,850	51,000	49,500	4,050	42,500	40,500
Bakersfield, South Jct. SR 99	4,050	42,500	40,500	5,800	71,000	68,000
H Street	5,800	71,000	68,000	7,000	73,000	70,000
South Chester Avenue IC	7,000	73,000	70,000	7,700	73,000	70,000
South Union Avenue IC	7,700	73,000	70,000	7,400	71,000	67,000
Cottonwood Road	7,400	71,000	67,000	7,100	69,000	65,000
Mt. Vernon Avenue IC	7,100	69,000	65,000	6,800	66,000	62,000
Oswell Street	6,800	66,000	62,000	5,000	54,000	51,000
Fairfax Road IC	5,000	54,000	51,000	3,800	38,000	36,000
Junction of SR 184	3,800	38,000	36,000	2,650	26,500	25,000
Edison Road IC	2,650	26,500	25,000	2,450	24,700	23,000
Comanche Drive IC	2,450	24,700	23,000	2,100	22,300	21,200
Tower Line Road IC	2,100	22,300	21,200	2,000	20,500	20,000
General Beale Road	2,000	20,500	20,000	1,900	19,400	19,000
Junction of SR 223	1,900	19,400	19,000	2,000	19,900	19,500
Bear Mountain Ranch	2,000	21,000	19,500	2,200	22,900	21,200
Junction of SR 202 Southwest	2,200	22,900	21,200	2,800	23,000	209,000
Tehachapi, Mill Street IC	2,800	23,000	20,900	1,950	21,300	20,500
Summit IC	1.950	21.300	20.500	1.950	20.900	19.500
Sand Canyon OH	1.950	20.900	19.500	2.000	21.400	20.000
Cameron Road IC	2.000	21.400	200.000	2.000	21.400	20.000
Randsburg Cut-Off Road	2.100	20.500	19.300	2.100	20.500	19.300
SR 58 Business	1.800	21.000	19.900	1.550	14.500	14.050
Junction of SR 14	1.550	14.500	14.050	1.500	15.100	14.000

Notes: IC = Interchange, AADT = annual average daily traffic, SR = State Route
Source: California Department of Transportation 2010

3.8.1.5 State Route 14

SR 14 is a north-south highway located east of the Covered Lands. As it passes east of the Covered Lands, SR 14 consists primarily of two travel lanes in each direction separated by a median. SR 14 connects the town of Mojave with the cities of Lancaster and Palmdale and serves a regional transportation function as it traverses between SR 58 and I-5. Traffic volumes east of the Covered Lands are free-flowing with heavy volumes between Lancaster/Palmdale and I-5, especially during weekday commute periods.

The primary access to the western portion of the Covered Lands would likely occur via SR 14, which is located several miles to the east. Table 3.8-5 presents the 2009 traffic counts for SR 14 at the Caltrans monitoring locations from the junction with the Angeles Forest Highway to SR 58.

Table 3.8-5. 2009 Caltrans SR 14 Traffic Counts (number of vehicles)

Off-Ramp or Intersection Location	South Peak Hour	South Peak Month	South AADT	North Peak Hour	North Peak Month	North AADT
Los Angeles County						
Angeles Forest Highway IC	7,600	102,000	97,000	5,600	76,000	72,000
Palmdale, Avenue S IC	5,600	76,000	72,000	6,300	80,000	77,000
Palmdale, South Jct. SR 138, Palmdale Boulevard	6,300	80,000	77,000	7,200	91,000	87,000
Palmdale, 10th Street West IC	7,200	91,000	87,000	7,500	94,000	90,000
Palmdale, Avenue N IC	7,500	94,000	90,000	7,800	98,000	93,000
Lancaster, Columbia Way/Avenue M IC	7,800	98,000	93,000	7,800	96,000	92,000
Lancaster, Avenue L IC	78,00	96,000	92,000	6,500	79,000	75,000
Lancaster, Avenue K IC	6,500	79,000	75,000	5,200	63,000	60,000
Lancaster, Avenue J-8/20th Street West IC	5,200	63,000	60,000	3,650	44,000	42,000
Lancaster, Avenue J IC	3,650	44,000	42,000	4,300	51,000	48,000
Lancaster, Avenue I IC	4,300	51,000	48,000	3,500	41,500	39,000
Lancaster, Avenue H IC	3,500	41,500	39,000	3,500	38,500	37,500
Avenue G IC	3,500	38,500	37,500	3,500	3,8000	36,500
Avenue F IC	3,500	38,000	36,500	3,400	36,500	35,000
North Junction of SR 138; Avenue D IC	3,400	36,500	35,000	3,250	34,500	33,500
Avenue A IC, Los Angeles/Kern County Line	3,250	34,500	33,500			
Kern County						
Avenue A IC, Los Angeles/Kern County Line				2,950	31,000	30,000
Rosamond Boulevard	2,850	32,500	31,000	2,000	18,000	17,600
Silver Queen Road	2,000	18,800	17,600	2,000	18,800	17,600
Mojave, South Junction of SR 58	1,900	19,200	18,300	1,750	18,300	17,800
Mojave, North Junction of SR 58	1,650	17,400	16,700	850	11,700	9,800

Notes: IC = Interchange, AADT = annual average daily traffic, SR = State Route
Source: California Department of Transportation 2010

3.8.2 Public Transit

There are no public transportation services in the Covered Lands. Public transit in the surrounding area is discussed below.

3.8.2.1 Bus

Kern Regional Transit operates bus service in the unincorporated portions of Kern County, including a daily route (except Sunday) between various locations in Bakersfield and Frazier Park, the Lebec Post Office, and the Flying J truck and travel facility in Frazier Park. In the summer, Kern Regional Transit operates the Frazier Park Community Route, which provides service to Frazier Park, Lake of the Woods, Pinon Pines, Gorman, and Pine Mountain Club. Dial-a-Ride service is also available Monday through Saturday in the Frazier Park and Lebec areas near the Covered Lands and in the East Kern and Tehachapi areas (Kern Regional Transit 1998, 2007, 2011).

3.8.3 Nonmotorized Transportation

There are no publicly dedicated bicycle or pedestrian routes in the study area. Private recreational activity including mountain biking and hiking (on existing ranch roads) occurs on a limited basis on the ranch and in the Covered Lands.

3.8.4 Other Modes of Transportation

3.8.4.1 Rail

There is no passenger rail service located close to the study area. The extreme northern portion of the study area is located approximately 2 miles south of an existing freight line (roughly paralleling SR 58). The nearest Amtrak passenger rail facility is located approximately 30 to 45 miles away in Bakersfield. The Lancaster Metrolink station is located approximately 55 miles away.

Planning for the California High-Speed Train is currently underway and includes a proposed route from Bakersfield to Palmdale along SR 38 (California High-Speed Rail Authority 2010). This route has only been examined programmatically. Although alternative alignments to be analyzed for this corridor are still being developed, all alignments currently under consideration run parallel to SR 58 to the north, and then turn south at Mojave to parallel SR 14 (California High Speed Rail Authority 2010). It is possible other alternative alignments could be proposed in the future. Stations would be in the terminus cities of Bakersfield, where the train would connect with the Fresno to Bakersfield Section, and Palmdale, where it would connect with the Palmdale to Los Angeles Section.

3.8.4.2 Air Travel

The nearest commercial airport is the Meadows Field Airport located approximately 35 to 50 miles north in Bakersfield. Another commercial airport is located in Burbank, approximately 65 miles to the south. A third commercial airport is located in Palmdale, approximately 60 miles to the southeast. There are small municipal airports in Tehachapi (Mountain Valley Airport), approximately 15 miles east of the northern portion of the Covered Lands, and in Bakersfield.

A private airstrip is located approximately 7 miles southeast of the Covered Lands near Quail Lake. This facility does not support jet aircraft and is not used by public carriers. Another private airstrip is located adjacent to the ranch off Laval Road East, and it is periodically used by TRC and local farms. Subject to permission from TRC, passenger, public service, and utility company helicopters can land in level locations throughout the Covered Lands, including near the Tejon Ranch headquarters.

3.9 Climate Change and Greenhouse Gases

This section discusses the considerations unique to greenhouse gas emissions (GHG) emissions and the potential effects on climate change to provide context for the discussion of potential effects associated with the proposed alternatives presented in Section 4.9, Climate Change and Greenhouse Gases. Climate change is a global phenomenon; however, the contributions to and impacts of climate change are considered here with respect to the Covered Lands. Therefore, the study area for this section is considered concurrent with the Covered Lands.

3.9.1 Sources of Greenhouse Gases

Some gases in the atmosphere affect the earth's heat balance by absorbing infrared radiation. This layer of gases in the atmosphere functions much the same as glass in a greenhouse. This is why this heating of the atmosphere is also known as the *greenhouse effect*, and the gases that cause this effect are referred to as GHGs. GHGs include water vapor, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), ozone (O_3), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3). Important characteristics of GHGs, including global warming potential, lifetime in the atmosphere, and atmospheric concentration as of 2005, are shown in Table 3.9-1. The global warming potential is the ratio of heat trapped by one unit mass of the GHG to that of one unit mass of CO_2 over a specified time period (U.S. Environmental Protection Agency 2010a).

GHG sources are both anthropogenic and natural. Human activities associated with industrial/manufacturing, utilities, transportation, residential, and agricultural sectors result in GHG emissions (California Energy Commission 2006). Transportation is responsible for 38% of California's GHG emissions, followed by electricity generation contributing 25% (California Air Resources Board 2007). Emissions of CO_2, CH_4, and N_2O are byproducts of fossil fuel combustion. Methane, a highly potent GHG, also results from off-gassing associated with agricultural practices, landfills, and wastewater treatment. Natural sources of GHGs include water vapor and naturally occurring CO_2, CH_4, N_2O, and O_3. GHGs remain in the atmosphere for a long period of time, adding to their capabilities to create greenhouse effects. Natural GHG sinks also exist, which deplete the atmosphere of GHGs. GHGs are utilized by plant life during photosynthesis to produce nutrient-rich sugars. Manmade GHGs, which have a much greater heat-absorption potential than CO_2, include HFCs, PFCs, SF_6, and NF_3, which are associated with certain industrial products and processes (California Environmental Protection Agency 2006).

Table 3.9-1. Characteristics of Significant Greenhouse Gases

Greenhouse Gas[1]	Global Warming Potential	Lifetime (years)	Concentration	Units
CO_2	1	50-200	379	parts per million
CH_4	21	9-15	1.7	parts per million
N_2O	310	120	0.32	parts per million
HFC-23	11,700	264	18	parts per trillion
HFC-134a	1,300	14.6	35	parts per trillion
HFC-152a	140	1.5	3.9	parts per trillion
CF_4	6,500	50,000	74	parts per trillion
C_2F_6	9,200	10,000	2.9	parts per trillion
SF_6	23,900	3,200	5.6	parts per trillion

Notes:

CO_2 = carbon dioxide; CH_4 = methane; N_2O; HFC = hydrofluorocarbons; CF_4 = tetrafluormethane C_2F_6 = hexafluoroethane; SF_6 = sulfur hexafluoride.

[1]CF_4 and C_2F_6 are perfluorocarbons. The global warming potential (GWP) values are for 100-year time horizon. The GWP values presented above are based on the Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report (SAR) and United Nations Framework Convention on Climate Change (UNFCCC) reporting guidelines (Intergovernmental Panel on Climate Change 1996). Although the IPCC Fourth Assessment Report (AR4) presents different GWP estimates, the current inventory standard relies on SAR GWPs to comply with reporting standards and consistency with regional and national inventories (U.S. Environmental Protection Agency 2010a).

Sources: Intergovernmental Panel on Climate Change 1996, 2001, 2007a

Worldwide, California is the 12th to 16th largest emitter of CO_2 and is responsible for approximately 2% of the world's CO_2 emissions (California Energy Commission 2006). In 2008, the most recent year for which statewide data are available, California produced 478 million gross metric tons of carbon dioxide equivalent (CO_2e) (California Air Resources Board 2010a). In comparison, the United States produced 6,957 million gross metric tons of CO_2e in 2008 (U.S. Environmental Protection Agency 2010b). As emissions of GHGs increase, temperatures in California are projected to rise significantly over the 21st century. The modeled magnitudes of this warming vary because of uncertainties in future emissions and in climate sensitivity. According to the California Climate Change Center, there are three projected warming scenarios referred to as the low, medium, and high range (California Energy Commission 2005). These rises (during the period of 2000 to 2100) vary from approximately 1.7°C to 3.0°C (3.0°F to 5.4°F) in the lower range of projected warming, 3.1°C to 4.3°C (5.5°F to 7.8°F) in the medium range, and 4.4°C to 5.8°C (8.0°F to 10.4°F) in the higher range.

Unlike criteria pollutants and toxic air contaminants (TACs), which are pollutants of regional and local concern, GHGs are global pollutants, and climate change is a global concern. Effects of GHG emissions are a function of their total atmospheric concentration and most GHGs are globally well-mixed atmospheric constituents. Therefore, the location of a particular GHG emission, in contrast to criteria pollutants or TACs, does not change its environmental effect.

3.9.2 Considerations from Global Climate Change

Several potential direct and indirect effects of climate change were identified in the 2009 California Climate Adaptation Strategy (CAS) (California Natural Resources Agency 2009). Climate changes identified in the CAS as currently occurring in California include the following:

- Increased average temperature
- More extreme hot days and fewer cold nights
- Seasonal shifts and lengthening of growing season
- Shifts in precipitation patterns, with less snowpack and snowmelt and rainwater running off sooner

As a result, the CAS found that there have been the following effects, including:

- More frequent and intense wildfires
- Increased sea level by up to 7 inches
- Reduction in water supply
- Stress on infrastructure

The CAS also identified several projected future effects of climate change based on information developed by the Intergovernmental Panel on Climate Change (IPCC) (2007b). These projected effects are uncertain because they depend on several assumptions of the various climate models, levels of future emissions, and uncertainty related to societal choices and policies (e.g., business as usual or cooperative efforts to reduce GHGs). The projected future effects identified by the CAS (California Natural Resources Agency 2009) that would occur under most climate change scenarios in California generally include:

- Temperature rise
    - 2°F to 5°F by 2050
    - 4°F to 9°F by 2100
    - More pronounced warming in summer than winter
    - More pronounced warming inland than in coastal areas
    - All models predict increased temperatures, with level of GHG emissions the biggest uncertainty
- Extreme weather events
    - More frequent and longer heat waves
    - More frequent and more intense wildfires
    - Prolonged drought
    - Increased winter and spring flooding due to more rain relative to snow, and earlier snowmelt

- Precipitation changes
  - 12% to 35% reduction by 2050
  - High uncertainty due to different models of where and how much snowfall and rain patterns will change
    - 11 of 12 precipitation models show overall decreases in rainfall in northern California (12% to 35%)
    - More water will fall as rain than as snow, affecting runoff patterns (earlier snowmelt)
- Seasonal shifts
- Sea level rise
  - 12 to 18 inches by 2050
  - 21 to 55 inches by 2100
- Generally hotter and drier conditions
- Potential abrupt climate change (although most models project gradual changes, tipping or threshold events [e.g., reduction in Arctic sea ice, accelerated Greenland/Antarctic ice sheet melting, warming of the Amazon, intensification of El Nino/Southern Oscillation Cycles] could cause rapid or abrupt changes).

Future climate change effects on Tejon Ranch, and specifically the Covered Lands, cannot be predicted with a high level of certainty, but it is expected that Tejon Ranch will experience warmer temperatures, altered precipitation, seasonal shifts, and lengthening of the growing season. The potential effects of such changes, both directly from climate change and indirectly from more frequent and intense wildfires, include alterations in runoff patterns, hydrology, vegetation communities, microclimates, and microhabitats. The potential effects of the alternatives on climate change and of climate change on the alternatives are discussed in Section 4.9, Climate Change and Greenhouse Gases. More detailed information regarding the potential effects of climate change is presented in Appendix C.